① Test Specifications Fuel Injection Pumps and Governors

①

En

WPP 001/4 SAV 5,2 f

6. Edition

PES 6 MW 100/320 RS 1009
RQV 300...1400 MW 15 R
Komb. Nr. 0 403 446 113
1 - 5 - 3 - 6 - 2 - 4 = - 60 - 120 - 180 - 240 - 300 ± 0,5 (0,75)°

supersedes 11.80
company: SAVIEM
engine MIDR 06.02-12

All test specifications are valid for Bosch Fuel Injection Pump Test Benches and Testers

A. Fuel Injection Pump Settings

Port closing at prestroke 3,00 - 3,10 (2,95 - 3,15) mm (from BDC) Control rod travel = 9,0 - 12,0 mm

Rotational speed rev/min 1	Control rod travel mm 2	Fuel delivery cm³/100 strokes 3	Difference cm³/100 strokes 4	Control rod travel mm 2	Fuel delivery cm³/100 strokes 3	Spring pre-tensioning (torque-control valve) mm 6
1400	11,6 *0.1	9,4 - 9,6	0,35 (0,6)			
300	6,0 - 6,2	0,95 - 1,35	0,35 (0,55)			
900	See	sect. C!	0,5 (0,7)			
500	"	"	0,35 (0,6)			

Adjust the fuel delivery from each outlet according to the values in ☐

Testoil-ISO 4113

B. Governor Settings

Upper rated speed			Intermediate rated speed			Lower rated speed			Sliding sleeve travel ①	
Degree of deflection of control lever 1	rev/min Control rod travel mm 2	Control rod travel ①e mm rev/min ②e 3	Degree of deflection of control lever 4	rev/min 5	Control rod travel ④ mm 6	Degree of deflection of control lever 7	rev/min 8	Control rod travel ③ mm 9	rev/min 10	mm 11
ca. 68	1400 1700	15,2 - 17,8 0,0 - 1,0				ca. 12	100	min. 8,0	1440 - 1450	= 8,2
ca. 64	10,7	1440-1450					300	6,0 - 6,2	380 - 430	= 2,5
	4,0	1570-1600				③a	480 - 540 = 2,0		300	1,2-1,3

Torque control travel a = mm

C. Settings for Fuel Injection Pump with Fitted Governor

Full-load delivery Control-rod stop Test oil temp. 40°C (104°F) ②		Rotational-speed limitation ②b intermediate speed ④a	Fuel delivery characteristics high idle speed ⑤a		Starting fuel delivery ⑥ idle switching point ⑤b		Torque-control travel ⑤	
rev/min 1	cm³/1000 strokes 2	rev/min 3	rev/min 4	cm³/1000 strokes 5	rev/min 6	cm³/1000 strokes 7	rev/min 8	Control rod travel mm 9
LDA 1400	0,67 bar 94,0 - 96,0 (92,0 - 98,0)	1440-1450*	LDA 900	0,67 bar 84,0 - 88,0 (82,0 - 90,0)	100	80,0 - 90,0		
					300	9,5 - 13,5 (7,0 - 16,0)		
			LDA 500	0 bar 63,0 - 65,0 (61,0 - 67,0)		100 - 230 (80 - 250)		

Checking values in brackets

* 1 mm less control rod travel than col. 2

5.82

BOSCH

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D. Adjustment Test for Manifold Pressure Compensator

Test at n = 500 rev/min decreasing pressure - in bar gauge pressure

Pump/governor	Setting Gauge pressure = bar	Measurement Gauge pressure = bar	Control rod travel-diminution difference mm (1)
RS 1009/MW 15	0,67	0 0,25	11,6 - 11,7 11,0 - 11,1 11,3 - 11,4

Notes:
(1) when n = rev/min and gauge pressure = bar (= maximum full-load control rod travel)

Testoil-ISO 4113

② Test Specifications Fuel Injection Pumps and Governors ②

WPP 001/4 MB 14,6 g

En

4. Edition

PE 8 P 120 A 320 LS 3807
RQ 300/1150 PA 546
Komb. Nr. 0 401 848 733
1 - 8 - 7 - 2 - 6 - 3 - 5 - 4 je 45° ± 0,5° (± 0,75°)

supersedes 4.83
company: Daimler-Benz
engine OM 422 A
243 kw (330 PS)

Values only apply to test nozzle-and-holder assembly 1 688 901 019 and fuel-injection test tubing 1 680 750 067.

All test specifications are valid for Bosch Fuel Injection Pump Test Benches and Testers

A. Fuel Injection Pump Settings

Port closing at prestroke 4,0 - 4,1 (3,95 - 4,15) mm (from BDC)

Rotational speed rev/min 1	Control rod travel mm 2	Fuel delivery cm³/100 strokes 3	Difference cm³/100 strokes 4	Control rod travel mm 2	Fuel delivery cm³/100 strokes 3	Spring pre-tensioning (torque-control valve) mm 6
1150	$10,7^{+0,1}$	15,6 - 15,8	0,5 (0,9)			
300	5,2 - 5,4	1,2 - 1,8	0,8 (1,2)			
750/500	---	C, 4 u. 5	0,7 (1,1)			

Adjust the fuel delivery from each outlet according to the values in ☐

Testoil-ISO 4113

B. Governor Settings

Checking of slider PRG-check ①		Full-load speed regulation Setting point		Test specifications ④		Idle speed regulation Setting point		Test specifications ⑤		Torque control ③	
rev/min 1	Control rod travel mm 2	rev/min 3	Control rod travel mm 4	Control rod travel mm 5	rev/min 6	rev/min 7	Control rod travel mm 8	rev/min 9	Control rod travel mm 10	rev/min 11	Control rod travel mm 12
600	19,2 - 20,8	600	20,0	9,7 4,0	1200 - 1215 1235 - 1270	300	4,5	100 300 340 - 380 = 2,0	min. 6,0 4,4 - 4,6	1150 750 900	10,7 - 10,3 11,0 - 11,3 10,9 - 11,3
VH = max. 46°											

Torque-control travel on flyweight assembly dimension a = 0,2 mm

Speed regulation: At 1200 - 1215 min^{-1}

1 mm less control rod travel

C. Settings for Fuel Injection Pump with Fitted Governor

Full-loadet delivery on governor control lever Test oil temp. 40°C (104°F) ②		Control rod stop ③a	Fuel delivery characteristics ③b		Starting fuel delivery idle speed ⑥	
rev/min 1	cm³/1000 strokes 2	rev/min 3	rev/min 4	cm³/1000 strokes 5	rev/min 6	Control rod travel cm³/1000 strokes / mm 7
LDA 1150	0,7 bar 156,0 - 158,0 (153,0 - 161,0)		LDA 750	0,7 bar 172,0 - 174,0 (169,0 - 177,0)	100	140,0 - 160,0 (136,0 - 164,0)
			LDA 500	0 bar 135,0 - 137,0 (132,0 - 140,0)		

Checking values in brackets

6.83

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D. Adjustment Test for Manifold Pressure Compensator

Test at n = 500 rev/min decreasing pressure - in bar gauge pressure

Pump/governor	Setting Gauge pressure = bar	Measurement Gauge pressure = bar	Control rod travel-diminution difference mm (1)
PE 8 P..LS 3807 + ..PA 546	0,47		10,9 - 11,3
		0	10,2 - 10,4
		0,40	10,3 - 10,6

Notes:
(1) when n = rev/min and gauge pressure = bar (= maximum full-load control rod travel)

Testoil-ISO 4113

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Test Specifications Fuel Injection Pumps and Governors

① ① WPP 001/4 MB 3,8 a

En 3. Edition

PES 4 A 80 C 410 RS 2094 RQV 300-1425 AB 564 D, 579 D
RS 2206 RQV 300-1300 AB 564 D
RS 2094, RS 2244 RQV 300-1000/1425 AB 578 D,
RS 2244 A RQV 300-1425 AB 623 DL, 624 D
.. D ..

supersedes 12.74
company: Daimler-Benz
engine OM 314

All test specifications are valid for Bosch Fuel Injection Pump Test Benches and Testers

A. Fuel Injection Pump Settings

Port closing at prestroke 2,15 - 0,1 mm (from BDC)

Rotational speed rev/min 1	Control rod travel mm 2	Fuel delivery cm³/100 strokes 3	Difference cm³/ 100 strokes 4	Control rod travel mm 2	Fuel delivery cm³/100 strokes 3	Spring pre-tensioning (torque-control valve) mm 6
1000	9	5,5 - 6,0	0,4			
	6	2,2 - 3,0				
	15	11,5 - 12,8				
200	6	1,3 - 2,2				

Testoil-ISO 4113

Adjust the fuel delivery from each outlet according to the values in ☐

B. Governor Settings

RQV 300 - 1425 AB 564 D

Upper rated speed			Intermediate rated speed			Lower rated speed			Sliding sleeve travel Torque-control travel	
Degree of deflection of control lever 1	rev/min Control rod travel mm 2	Control rod travel mm rev/min 3	Degree of deflection of control lever 4	rev/min 5	Control rod travel mm 6	Degree of deflection of control lever 7	rev/min 8	Control rod travel mm 9	rev/min 10	mm 11
ca. 66	1425	16,0 - 19,3				ca. 10	100	7,0 - 8,0	1425	8,3
	1450	14,6 - 18,2					250	5,5 - 7,0	--	--
	1550	8,2 - 13,3					400	3,5 - 5,2	1400	
	1650	1,3 - 8,0					500	2,5 - 3,7	600	0,35-0,45
	1750	0 - 2,5					600	1,4 - 2,8		
	1800	0					770	0		

Torque control travel a = 0,35 mm

C. Settings for Fuel Injection Pump with Fitted Governor

Full-load delivery Control-rod stop Test oil temp. 40°C (104°F)		Rotational-speed limitation	Fuel delivery characteristics		Starting fuel delivery idle switching point		Intermediate rotational speed Torque-control travel	
rev/min 1	cm³/1000 strokes 2	rev/min 3	rev/min 4	cm³/1000 strokes 5	rev/min 6	cm³/1000 strokes 7	rev/min 8	mm 9
1400	58,0 - 60,0	1460-1470*	1000	51,5 - 54,5	100	7,3 - 8,3		
			800	49,0 - 52,0				
			500	45,5 - 48,5				
	(increase by ± 3 cm³)							./.

Checking values in brackets

* 1 mm less control rod travel than col. 2

10.75

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B. Governor Settings

Upper rated speed			Intermediate rated speed			Lower rated speed			Sliding sleeve travel ①	
Degree of deflection of control lever	rev/min Control rod travel mm	Control rod travel ⑱ mm rev/min ㉘	Degree of deflection of control lever	rev/min	Control rod travel mm ④	Degree of deflection of control lever	rev/min	Control rod travel mm ③	rev/min	mm
1	2	3	4	5	6	7	8	9	10	11
ca. 68	1400 1450 1500 1550 1660	12,0 - 15,4 8,0 - 12,5 03,4 - 9,6 0 - 6,6 0	ca. 62	1000 1100 1200 1400 1490	12,0 - 14,6 5,2 - 8,2 5,2 - 5,6 1,7 - 4,8 0	ca. 10 ㉚	200 300 350 400 740	7,8 - 8,0 6,0 - 6,8 5,0 3,2 - 3,9 0	300 800 1130-1350 1400 --	0,5 - 0,9 4,3 - 4,7 7,4 - 7,6 7,9 --

Torque control travel a = 0 mm

C. Settings for Fuel Injection Pump with Fitted Governor

Full-load delivery Control-rod stop Test oil temp. 40°C (104°F) ②		Rotational-speed limitation ㉖ intermediate speed ㊽	Fuel delivery characteristics ㊺ high idle speed ㊻		Starting fuel delivery ⑥ idle switching point		Torque-control travel	
rev/min	cm³/1000 strokes	rev/min	rev/min	cm³/1000 strokes	rev/min	cm³/1000 strokes	rev/min	Control rod travel mm
1	2	3	4	5	6	7	8	9
800	47,0 - 49,0 (increase by ± 0.5 cm³)	1460-1470*	1400 500	56,5 - 59,5 41,5 - 44,5	100 Change-over point 230 - 300 U/min	7,3 - 8,3	700	

Checking values in brackets

* 1 mm less control rod travel than col. 2

Testoil-ISO 4113

B. Governor Settings

RQV 300 - 1425 AB 579 D

Upper rated speed			Intermediate rated speed			Lower rated speed			Sliding sleeve travel Torque-control travel	
Degree of deflection of control lever	rev/min Control rod travel mm	Control rod travel ⑱ mm rev/min ㉘	Degree of deflection of control lever	rev/min	Control rod travel mm ④	Degree of deflection of control lever	rev/min	Control rod travel mm ③	rev/min	mm ①
1	2	3	4	5	6	7	8	9	10	11
ca. 66	1425 1450 1550 1650 1800	16,0 - 19,3 14,6 - 18,2 8,2 - 13,3 1,3 - 8,0 0				ca. 10 ㉚	100 250 400 550 770	7,0 - 8,0 5,5 - 7,0 3,5 - 5,2 2,0 - 3,3 0	1425 --	8,3 --

Torque control travel a = 0 mm

C. Settings for Fuel Injection Pump with Fitted Governor

Full-load delivery Control-rod stop Test oil temp. 40°C (104°F) ②		Rotational-speed limitation ㉖ intermediate speed ㊽	Fuel delivery characteristics ㊺ high idle speed ㊻		Starting fuel delivery ⑥ idle switching point		Torque-control travel	
rev/min	cm³/1000 strokes	rev/min	rev/min	cm³/1000 strokes	rev/min	cm³/1000 strokes	rev/min	Control rod travel mm
1	2	3	4	5	6	7	8	9
800	47,0 - 49,0 (increase by ± 0.5 cm³)	1460-1470*	1400 500	56,5 - 59,5 41,5 - 44,5	100 Change-over point 230 - 300 U/min	7,3 - 8,3	1300	

./.

Checking values in brackets

* 1 mm less control rod travel than col. 2

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B. Governor Settings

Upper rated speed			Intermediate rated speed			Lower rated speed			Sliding sleeve travel / Torque-control travel	
Degree of deflection of control lever	rev/min Control rod travel mm	Control rod travel ⑮ mm rev/min ⑫	Degree of deflection of control lever	rev/min	Control rod travel mm ④	Degree of deflection of control lever	rev/min	Control rod travel mm ③	rev/min	mm ①
1	2	3	4	5	6	7	8	9	10	11
ca. 66	1300	15,0 - 17,8				ca. 10	200	5,7 - 7,2	1300	8,3
	1350	10,5 - 14,5					350	3,8 - 5,3	1300	0
	1420	7,7 - 11,1					500	1,9 - 3,2	550	0,25-0,45
	1490	0 - 7,0					640	0 - 1,3		
	1600	0					700	0		
						⑬				

Torque control travel a = 0,35 mm

C. Settings for Fuel Injection Pump with Fitted Governor

Full-load delivery Control-rod stop Test oil temp. 40°C (104°F) ②		Rotational-speed limitation ⑫ intermediate speed ⑭	Fuel delivery characteristics ⑤ high idle speed ⑤		Starting fuel delivery ⑥ idle switching point		Torque-control travel	
rev/min	cm³/1000 strokes	rev/min	rev/min	cm³/1000 strokes	rev/min	cm³/1000 strokes	rev/min	Control rod travel mm
1	2	3	4	5	6	7	8	9
1280	46,5 - 48,5	1320-1330*	1000	44,5 - 47,5	100	7,3 - 8,3		
			500	36,0 - 39,0	Change-over point 230 - 300 U/min			
	(increase by ± 0.5 cm³)							

Checking values in brackets

* 1 mm less control rod travel than col. 2

Testoil-ISO 4113

B. Governor Settings

300 - 1425 AB 623 D, .. 624 D

Upper rated speed			Intermediate rated speed			Lower rated speed			Sliding sleeve travel	
Degree of deflection of control lever	rev/min Control rod travel mm	Control rod travel ⑮ mm rev/min ⑫	Degree of deflection of control lever	rev/min	Control rod travel mm ④	Degree of deflection of control lever	rev/min	Control rod travel mm ③	rev/min	mm ①
1	2	3	4	5	6	7	8	9	10	11
ca. 68	1425	16,0 - 19,0				ca. 10	200	6,0 - 7,4	1425	8,3
	1500	10,8 - 15,3					300	4,9 - 6,6	--	--
	1600	3,3 - 10,0					400	3,5 - 5,1	1400	0
	1650	0 - 7,4					500	2,5 - 3,7	600	0,35-0,45
	1770	0					770	0		
						⑬				

Torque control travel a = 0,35 mm

C. Settings for Fuel Injection Pump with Fitted Governor

Full-load delivery Control-rod stop Test oil temp. 40°C (104°F) ②		Rotational-speed limitation ⑫ intermediate speed ⑭	Fuel delivery characteristics ⑤ high idle speed ⑤		Starting fuel delivery ⑥ idle switching point		Torque-control travel	
rev/min	cm³/1000 strokes	rev/min	rev/min	cm³/1000 strokes	rev/min	cm³/1000 strokes	rev/min	Control rod travel mm
1	2	3	4	5	6	7	8	9
1400	58,0 - 60,0	1460-1470*	1000	51,5 - 54,5	100	7,3 - 8,3	623 D = 1300	
			800	49,0 - 52,0				
			500	45,5 - 48,5	Change-over point 230 - 300 U/min		624 D = 700	
	(increase by ± 0.5 cm³)							

Checking values in brackets

* 1 mm less control rod travel than col. 2

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BOSCH TEST SPECS. IP ASSEMBLY

TEST SHEET : VOL 12,2 f
Edition : 06.93 (4) EN
Type number : 0 411 826 772
Type number : 0 421 890 008
CUSTOMER IDENT. NO.:

Pump: PES 6 P 120 A 320 RS 3207
Regulator: RE 24
IP-ASSEMBLY: 0 401 996 700

Customer-specific details
Customer: VOLVO
Engine: TD 122
Output kW: 283
at 1/min:

		Min	Max
Test PREREQUISITES			
Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 064	
Inlet pressure	bar	1.5	1.6
Overflow 1)	l/h	100	120
Calibrating nozzle-holder assembly		1 688 901 019	
Opening pressure	bar	207	210
Perforated plate diameter	mm	0.8	
Test pressure line		1 680 750 075	
Dimensions:			
Outer diameter.	mm	8.0	
x wall thickness	mm	2.5	
x length	mm	1000	
TEST SPECIFICATIONS			

Section A -
Setting values of injection pump
- Check values denoted by "P"
- No basic setting. Equal delivery setting under Section C.

PORT CLOSING

PC setting cyl.		1	
Test pressure	ba	25	27
Prestroke (from BDC)	mm	3.60	3.70
P Prestroke (from BDC)	mm	3.55	4.75
Control-rod travel	mm	10.0	11.0
Cam sequence 1 - 5 - 3 - 6 - 2 -4			
PC difference	°CS	60 each	
tolerance +/-	°CS		0.50
P tolerance +/-	°CS		0.75

		Min	Max
PC mark	Cyl.-No.	- 2)	
Pulse wheel position (PC cam)	°CS	0 3)	
Tolerance +/-	°CS		0.20
P Tolerance +/-	°CS		0.75

Section B -

Actuator test
- Check values denoted by "P"
- Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5V

CONTROL-ROD PICKUP SETTING

Test speed	1/min	0	
Setting value			
U/actual	V	3.100	
Control-rod travel	mm	12.95	13.05
P Control-rod travel	mm	12.90	13.10
Check value			
U/actual	V	1.700	
Control-rod travel	mm	5.90	6.40
P Control-rod travel	mm	5.85	6.45
Stop position			
U/actual	V	mind.	4)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1

SPEED SENSOR SIGNALS

- Test with control rod in stop position

Speed	1/min	60	
pos.amplitude	V	0.8	2.0
P pos.amplitude	V	0.6	3.0
Speed	1/min	600	
Difference Amplitude to Amplitude	V	max. 1.4	

Continued on next page

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(+2

		Min	Max

Section C -

Injection pump with actuator

- Check values denoted by "P"

FUEL DELIVERY TEST AND SETTING

	Test point V1			
	Speed	1/min	700	
	U/actual	V	3.100	
	Fuel delivery	cm3/1000str	248.0	250.0
P	Fuel delivery	cm3/1000str	245.0	253.0
	Dispersion	cm3/1000str		5.0
P	Dispersion	cm3/1000str		9.0
	Test point L1			
	Speed	1/min	250	
	U/actual	V	1.240	1.360
	Fuel delivery	cm3/1000str	20.0	26.0
	Dispersion	cm3/1000str		5.0
P	Dispersion	cm3/1000str		9.0

REMARKS

VOLVO-No.:

Dimension "Y"
(Adjustment flange) - -

1) = Setting of overflow at full load (refer to measurement point V1)

2) = No start-of-delivery mark.

3) = Setting of pulse-wheel position at start of delivery of cylinder No. 1.

4) = U/actual value min: U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

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BOSCH TEST SPECS. IP ASSEMBLY

Pump: PES 6 P 120 A 720 RS 7178
Regulator: RE 30
IP-ASSEMBLY: 0 402 796 800

TEST SHEET : MAC 12.0 g
Edition : 06.93 (5) EN
Type number : 0 412 726 822
Type number : 0 421 890 009
CUSTOMER IDENT. NO.:

Customer-specific details
Customer: MACK
Engine: E 7 - 400
Output kW: - -
at 1/min:

		Min	Max
Test PREREQUISITES			
Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 011	
Inlet pressure	bar	1.9	2.0
Overflow 1)	l/h	160	170
Calibrating nozzle-holder assembly		1 688 901 101	
Opening pressure	bar	207	210
Perforated plate diameter	mm	0.6	
Test pressure line		1 680 750 008	
Dimensions:			
Outer diameter.	mm	6.0	
x wall thickness	mm	2.0	
x length	mm	600	
TEST SPECIFICATIONS			
Section A -			
Setting values of injection pump			
- Check values denoted by "P"			
- No basic setting. Equal delivery setting under Section C.			
PORT CLOSING			
PC setting cyl.		6	
Test pressure	bar	22	24
Prestroke (from BDC)	mm	2.75	2.85
P Prestroke (from BDC)	mm	2.70	2.90
Control-rod travel	mm	10.3	10.7
Cam sequence		6 - 2 - 4 - 1 - 5 - 3	
PC difference	°CS	60 each	
tolerance +/-	°CS		0.50
P tolerance +/-	°CS		0.75

		Min	Max
PC mark	Cyl.-No.	- 2)	
Pulse wheel position (PC cam)	°CS	0 3)	
Tolerance +/-	°CS		0.20
P Tolerance +/-	°CS		0.75
Section B -			
Actuator test			
- Check values denoted by "P"			
- Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5V			
CONTROL-ROD PICKUP SETTING			
Test speed	1/min	0	
Setting value			
U/actual	V	3.100	
Control-rod travel	mm	12.95	13.05
P Control-rod travel	mm	12.90	13.10
Check value			
U/actual	V	1.700	
Control-rod travel	mm	5.90	6.40
P Control-rod travel	mm	5.85	6.45
Stop position			
U/actual	V	mind.	4)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1
SPEED SENSOR SIGNALS			
- Test with control rod in stop position			
Speed	1/min	60	
pos.amplitude	V	0.8	2.0
P pos.amplitude	V	0.6	3.0
Speed	1/min	600	
Difference Amplitude to Amplitude	V	max. 1.4	

Continued on next page

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			Min	Max
S e c t i o n C -				
Injection pump with actuator				
- Check values denoted by "P"				
FUEL DELIVERY TEST AND SETTING				
Test point V1				
Speed	1/min		900	
U/actual	V		3.400	
Fuel delivery	cm3/1000str		269.0	271.0
P Fuel delivery	cm3/1000str		266.0	274.0
Dispersion	cm3/1000str			7.0
P Dispersion	cm3/1000str			11.0
Test point L1				
Speed	1/min		325	
U/actual	V		1.290	1.410
Fuel delivery	cm3/1000str		22.0	28.0
Dispersion	cm3/1000str			8.0
P Dispersion	cm3/1000str			12.0

REMARKS

MACK-No.: 313 GC 5183-P6

Dimension "Y" (Adjustment flange) (If provided; adjustement flange was introduced in the course of series production)	15.6	15.9

1) = Setting of overflow at full load (refer to measurement point V1).

2) = No start-of-delivery mark.

3) = Setting of pulse-wheel position at start of delivery of cylinder No. 6.

4) = U/actual value min: U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

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BOSCH TEST SPECS. IP ASSEMBLY

Pump: PE 6 P 120 A 320 RS 3239
Regulator: RE 24
IP-ASSEMBLY 0 401 996 701

TEST SHEET : VOL 12,2 g
Edition : 06.93 (4) EN
Type number : 0 411 826 785
Type number : 0 421 890 008
CUSTOMER IDENT. NO.:

Customer-specific details
Customer: VOLVO
Engine: TD 122 (USA)
Output kW: 268
at 1/min:

		Min	Max
Test PREREQUISITES			
Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 064	
Inlet pressure	bar	1.5	1.6
Overflow 1)	l/h	-	-
Calibrating nozzle-holder assembly		1 688 901 019	
Opening pressure	bar	207	210
Perforated plate diameter	mm	0.8	
Test pressure line		1 680 750 075	
Dimensions:			
Outer diameter.	mm	8.0	
x wall thickness	mm	2.5	
x length	mm	1000	

TEST SPECIFICATIONS

Section A -

Setting values of injection pump
- Check values denoted by "P"
- No basic setting. Equal delivery setting under Section C.

PORT CLOSING

			Min	Max
	PC setting cyl.		1	
	Test pressure	bar	25	27
	Prestroke (from BDC)	mm	2.60	2.70
P	Prestroke (from BDC)	mm	2.55	2.75
	Control-rod travel	mm	10.0	11.0
	Cam sequence		1 - 5 - 3 - 6 - 2 - 4	
	PC difference	°CS	60 each	
	tolerance +/-	°CS		0.50
P	tolerance +/-	°CS		0.75

			Min	Max
	PC mark Cyl.-No.		1 2)	
	Pulse wheel position (PC cam)	°CS	0 3)	
	Tolerance +/-	°CS		0.20
P	Tolerance +/-	°CS		0.75

Section B -

Actuator test
- Check values denoted by "P"
- Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5V

CONTROL-ROD PICKUP SETTING

	Test speed	1/min	0	
	Setting value			
	U/actual	V	3.100	
	Control-rod travel	mm	12.95	13.05
P	Control-rod travel	mm	12.90	13.10
	Check value			
	U/actual	V	1.70	
	Control-rod travel	mm	5.90	6.40
P	Control-rod travel	mm	5.85	6.45
	Stop position			
	U/actual	V	mind.	4)
	Control-rod travel	mm	0.5	1.0
P	Control-rod travel	mm	0.4	1.1

SPEED SENSOR SIGNALS

- Test with control rod in stop position

	Speed	1/min	60	
	pos.amplitude	V	0.8	2.0
P	pos.amplitude	V	0.6	3.0
	Speed	1/min	600	
	Difference Amplitude to Amplitude	V	max. 1.4	

Continued on next page

			Min	Max
S e c t i o n C -				
Injection pump with actuator				
- Check values denoted by "P"				
FUEL DELIVERY TEST AND SETTING				
Test point V1				
Speed	1/min		700	
U/actual	V		3.380	
Fuel delivery	cm3/1000str		251.0	254.0
P Fuel delivery	cm3/1000str		248.0	257.0
Dispersion	cm3/1000str			5.0
P Dispersion	cm3/1000str			9.0
Test point L1				
Speed	1/min		250	
U/actual	V		1.290	1.410
Fuel delivery	cm3/1000str		23.0	29.0
Dispersion	cm3/1000str			5.0
P Dispersion	cm3/1000str			9.0

REMARKS

Dimension "Y" (Adjustment flange) - -

1) = Setting of overflow at full load (refer to measurement point V1).

2) = Start of delivery mark at start of delivery of cylinder No 1.

3) = Setting of pulse-wheel position at start of delivery of cylinder No. 1.

4) = U/actual value min.: U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

BOSCH TEST SPECS. IP ASSEMBLY

TEST SHEET : DEE 10.1 k
Edition : 06.93 (5) EN
Type number : 0 412 016 729
Type number : 0 421 890 006
CUSTOMER IDENT. NO.:

Pump: PES 6 P 110 A 720 RS 3231
Regulator: RE 24
IP-ASSEMBLY 0 402 196 701

Customer-specific details
Customer: JOHN DEERE
Engine: 6101 HRW 02 (Tractor)
Output kW: 224
at 1/min:

		Min	Max
Test PREREQUISITES			
Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 057	
Inlet pressure	bar	1.5	1.6
Overflow	l/h	-	-
Calibrating nozzle-holder assembly		0 681 343 009	
Opening pressure	bar	172	175
Perforated plate diameter	mm	-	-
Test pressure line		1 680 750 015	
Dimensions:			
Outer diameter	mm	6.0	
x wall thickness	mm	1.5	
x length	mm	600	

TEST SPECIFICATIONS

Section A -

Setting values of injection pump
- Check values denoted by "P"
- No basic setting. Equal delivery setting under Section C.

PORT CLOSING

PC setting cyl.		1	
Test pressure	bar	25	27
Prestroke (from BDC)	mm	3.35	3.45
P Prestroke (from BDC)	mm	3.30	3.50
Control-rod travel	mm	9.0	12.0
Cam sequence		1 - 5 - 3 - 6 - 2 - 4	
PC difference °CS		60 each	
tolerance +/-°CS			0.50
P tolerance +/-°CS			0.75

		Min	Max
PC mark	Cyl.-No.	1 2)	
Pulse wheel position (PC cam)	°CS	10.5 3)	
Tolerance +/-°CS			1.70
P Tolerance +/-°CS			2.25

Section B -

Actuator test
- Check values denoted by "P"
- Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5V

CONTROL-ROD PICKUP SETTING

Test speed	1/min	0	
Setting value			
U/actual	V	3.100	
Control-rod travel	mm	12.95	13.05
P Control-rod travel	mm	12.90	13.10
Check value			
U/actual	V	1.700	
Control-rod travel	mm	5.90	6.40
P Control-rod travel	mm	5.85	6.45
Stop position			
U/actual	V	mind.	4)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1

SPEED SENSOR SIGNALS

- Test with control rod in stop position

Speed	1/min	60	
pos.amplitude	V	0.8	2.0
P pos.amplitude	V	0.6	3.0
Speed	1/min	600	
Difference Amplitude to Amplitude	V	max. 1.4	

Continued on next page

			Min	Max
Section C -				
Injection pump with actuator				
- Check values denoted by "P"				
FUEL DELIVERY TEST AND SETTING				
Test point V1				
Speed	1/min		1100	
U/actual	V		2.706	
Fuel delivery	cm3/1000str		176.0	178.0
P Fuel delivery	cm3/1000str		173.0	181.0
Dispersion	cm3/1000str			5.0
P Dispersion	cm3/1000str			9.0
Test point L1				
Speed	1/min		425	
U/actual	V		1.340	1.460
Fuel delivery	cm3/1000str		13.0	19.0
Dispersion	cm3/1000str			6.0
P Dispersion	cm3/1000str			10.0

REMARKS

Dimension "Y" (Adjustment flange)	-	-

2) = Port-closing mark 10.5° camshaft after port closing of cylinder 1.

3) = Pulse wheel position 10.5° camshaft after port closing of cylinder 1.

4) = U/actual value min.: U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

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BOSCH TEST SPECS. IP ASSEMBLY

TEST SHEET : DEE 7,7 1
Edition : 06.93 (4) EN
Type number : 0 412 026 727
Type number : 0 421 890 006
CUSTOMER IDENT. NO.:

Pump: PES 6 P 120 A 720 RS 3184
Regulator: RE 24
IP-ASSEMBLY: 0 402 196 700

Customer-specific details
Customer: JOHN DEERE
Engine: 6.466 A
Output kW: 161
at 1/min:

		Min	Max
Test PREREQUISITES			
Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 057	
Inlet pressure	bar	1.5	1.6
Overflow	l/h	-	-
Calibrating nozzle-holder assembly		1 688 901 101	
Opening pressure	bar	207	210
Perforated plate diameter	mm	0.6	
Test pressure line		1 680 750 015	
Dimensions:			
Outer diameter.	mm	6.0	
x wall thickness	mm	1.5	
x length	mm	600	
TEST SPECIFICATIONS			
Section A -			
Setting values of injection pump			
- Check values denoted by "P"			
- No basic setting. Equal delivery setting under Section C.			
PORT CLOSING			
PC setting cyl.		1	
Test pressure	bar	25	27
Prestroke (from BDC)	mm	3.55	3.65
P Prestroke (from BDC)	mm	3.50	3.70
Control-rod travel	mm	9.0	12.0
Cam sequence 1 - 5 - 3 - 6 - 2 - 4			
PC difference °CS		60 each	
tolerance +/-°CS			0.50
P tolerance +/-°CS			0.75

		Min	Max
PC mark Cyl.-No.		1 2)	
Pulse wheel position (PC cam)	°CS	10.5 3)	
Tolerance +/-°CS			1.70
P Tolerance +/-°CS			2.25
Section B -			
Actuator test			
- Check values denoted by "P"			
- Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5V			
CONTROL-ROD PICKUP SETTING			
Test speed	1/min	0	
Setting value			
U/actual	V	3.100	
Control-rod travel	mm	12.95	13.05
P Control-rod travel	mm	12.90	13.10
Check value			
U/actual	V	1.700	
Control-rod travel	mm	5.90	6.40
P Control-rod travel	mm	5.85	6.45
Stop position			
U/actual	V	mind.	4)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1
SPEED SENSOR SIGNALS			
- Test with control rod in stop position			
Speed	1/min	60	
pos.amplitude	V	0.8	2.0
P pos.amplitude	V	0.6	3.0
Speed	1/min	600	
Difference Amplitude to Amplitude	V	max. 1.4	

Continued on next page

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		Min	Max
Section C -			
Injection pump with actuator			
- Check values denoted by "P"			
FUEL DELIVERY TEST AND SETTING			
Test point V1			
Speed	1/min	1100	
U/actual	V	2.710	
Fuel delivery	cm3/1000str	140.0	142.0
P Fuel delivery	cm3/1000str	137.0	145.0
Dispersion	cm3/1000str		5.0
P Dispersion	cm3/1000str		9.0
Test point L1			
Speed	1/min	425	
U/actual	V	1.340	1.460
Fuel delivery	cm3/1000str	18.0	24.0
Dispersion	cm3/1000str		6.0
P Dispersion	cm3/1000str		10.0

REMARKS

Dimension "Y"
(Adjustment flange)

2) = Port-closing mark 10.5° camshaft after port closing of cylinder 1.

3) = Pulse wheel position 10.5° camshaft after port closing of cylinder No. 1.

4) = U/actual value min.: U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

BOSCH TEST SPECS. IP ASSEMBLY

TEST SHEET : SCA 14.2 k
Edition : 06.93 (6) EN
Type number : 0 412 628 826
Type number : 0 421 890 007
CUSTOMER IDENT. NO.:

Pump: PE 8 P 120 A 920/4 LS 7149
Regulator: RE 30
IP-ASSEMBLY: 0 402 698 802

Customer-specific details
Customer: SCANIA
Engine: DSC 1404
Output kW: 347
at 1/min:

		Min	Max
Test PREREQUISITES			
Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 025	
Inlet pressure	bar	1.5	1.6
Overflow	l/h	-	-
Calibrating nozzle-holder assembly		1 688 901 019	
Opening pressure	bar	207	210
Perforated plate diameter	mm	0.8	
Test pressure line		1 680 750 015	
Dimensions:			
Outer diameter.	mm	6.0	
x wall thickness	mm	1.5	
x length	mm	600	
TEST SPECIFICATIONS			
Section A -			
Setting values of injection pump			
- Check values denoted by "P"			
- No basic setting. Equal delivery setting under Section C.			
PORT CLOSING			
PC setting cyl.		1	
Test pressure	bar	25	27
Prestroke (from BDC)	mm	5.00	5.10
P Prestroke (from BDC)	mm	4.95	5.15
Control-rod travel	mm	9.0	12.0
Cam sequence		1-2-7-3-4-5-6-8	
PC difference	°CS	45 each	
tolerance +/-	°CS		0.50
P tolerance +/-	°CS		0.75

		Min	Max
PC mark	Cyl.-No.	1 2)	
Pulse wheel position (PC cam)	°CS	0 3)	
Tolerance +/-	°CS		0.20
P Tolerance +/-	°CS		0.75
Section B -			
Actuator test			
- Check values denoted by "P"			
- Assembly warm-up time: 3 mins. at n = 600 1/min, RPM actual = 2.5V			
CONTROL-ROD PICKUP SETTING			
Test speed	1/min	0	
Setting value			
RPM actual	V	3.100	
Control-rod travel	mm	12.95	13.05
P Control-rod travel	mm	12.90	13.10
Check value			
RPM actual	V	1.700	
Control-rod travel	mm	5.90	6.40
P Control-rod travel	mm	5.85	6.45
Stop position			
RPM actual	V	mind.	4)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1
SPEED SENSOR SIGNALS			
- Test with control rod in stop position			
Speed	1/min	60	
pos.amplitude	V	0.8	2.0
P pos.amplitude	V	0.6	3.0
Speed	1/min	600	
Difference Amplitude to Amplitude	V	max. 1.4	

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		Min	Max
Section C -			
Injection pump with actuator			
- Check values denoted by "P"			
FUEL DELIVERY TEST AND SETTING (Observe "Remarks" Point 5))			
Test point V1			
Speed	1/min	700	
RPM actual	V	3.180	
Fuel delivery	cm3/1000str	226.0	228.0
P Fuel delivery	cm3/1000str	223.0	231.0
Dispersion	cm3/1000str		6.0
P Dispersion	cm3/1000str		9.0
Test point L1			
Speed	1/min	225	
RPM actual	V	1.540	1.660
Fuel delivery	cm3/1000str	15.0	21.0
Dispersion	cm3/1000str		3.0
P Dispersion	cm3/1000str		6.0

REMARKS

SCANIA No.:

	Min	Max
Dimension "Y" (Adjustment flange) (If provided; adjustment flange was introduced in the course of series production)	15.6	16.1

2) = Start of delivery mark at start of delivery of cylinder No 1.

3) = Setting of pulse-wheel position at start of delivery of cylinder No. 1.

4) = RPM actual value min.: RPM actual minimum value with deenergized servo magnet and control rod in shutoff position.

REMARKS (Continued)

		Min	Max
5) = Feed rate checking and adjustment with ROBO diaphragm. Connection of the ROBO diaphragm: Pump page 2, front.			
Delivery-valve holder:			
* Valve spring pre-tension:	mm	3.2	3.4
* Allowed variation:	mm	3.0	3.5
* Required setting for new delivery-valve holders due to flattening:	mm	2.9	3.1

BOSCH TEST SPECS. IP ASSEMBLY

TEST SHEET : MAC 12.0 1
Edition : 06.93 (4) EN
Type number : 0 412 926 015
Type number : 0 421 890 009
CUSTOMER IDENT. NO.:

Pump : PES 6 P 120 A 720 RS 8007
Regulator: RE 30
IP-ASSEMBLY 0 402 996 298

Customer-specific details
Customer: MACK
Engine: E 7 - 400
Output kW: - -
at 1/min:

		Min	Max
Test PREREQUISITES			
Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 011	
Inlet pressure	bar	-	-
Overflow 1)	l/h	100	110
Calibrating nozzle-holder assembly		1 688 901 101	
Opening pressure	bar	207	210
Perforated plate diameter	mm	0.6	
Test pressure line		1 680 750 008	
Dimensions:			
Outer diameter.	mm	6.0	
x wall thickness	mm	2.0	
x length	mm	600	

TEST SPECIFICATIONS

Section A -

Setting values of injection pump
- Check values denoted by "P"
- No basic setting. Equal delivery setting under Section C.

PORT CLOSING 2)

PC setting cyl.		6	
Test pressure	bar	22	24
Prestroke (from BDC)	mm	3.55	3.65
P Prestroke (from BDC)	mm	3.50	3.70
Control-rod travel	mm	10.3	10.7
Cam sequence		6 - 2 - 4 - 1 - 5 - 3	
PC difference	°CS	60 each	
tolerance +/-	°CS		0.50
P tolerance +/-	°CS		0.75

		Min	Max
PC mark	Cyl.-No.	- 3)	
Pulse wheel position (PC cam)	°CS	0 4)	
Tolerance +/-	°CS		0.20
P Tolerance +/-	°CS		0.75

Section B -

Actuator test
- Check values denoted by "P"
- Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5V

CONTROL-ROD PICKUP SETTING

Test speed	1/min	0	
Setting value			
U/actual	V	3.100	
Control-rod travel	mm	12.95	13.05
P Control-rod travel	mm	12.90	13.10
Check value			
U/actual	V	1.700	
Control-rod travel	mm	5.90	6.40
P Control-rod travel	mm	5.85	6.45
Stop position			
U/actual	V	mind.	5)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1

SPEED SENSOR SIGNALS

- Test with control rod in stop position

Speed	1/min	60	
pos.amplitude	V	0.8	2.0
P pos.amplitude	V	0.6	3.0
Speed	1/min	600	
Difference Amplitude to Amplitude	V	max. 1.4	

Continued on next page

		Min	Max
Section C -			
Injection pump with actuator			
- Check values denoted by "P"			
FUEL DELIVERY TEST AND SETTING			
Test point V1			
Speed	1/min	900	
U/actual	V	2.930	
Fuel delivery	cm3/1000str	274.0	276.0
P Fuel delivery	cm3/1000str	271.0	279.0
Dispersion	cm3/1000str		5.0
P Dispersion	cm3/1000str		9.0
Test point L1			
Speed	1/min	325	
U/actual	V	1.080	1.200
Fuel delivery	cm3/1000str	22.0	28.0
Dispersion	cm3/1000str		8.0
P Dispersion	cm3/1000str		12.0

REMARKS

MACK-No.: 313 GC 5193-P1

Dimension "Y" (Adjustment flange)		15.6	15.9

1) = Setting of overflow at full load (refer to measurement point V1).

2) = Note additional test "Start-of-delivery difference":

Between	CRT mm	10.5	
and	CRT mm	20.0	
Difference	°CS	0.7	0.8

3) = No start-of-delivery mark.

4) = Setting of pulse-wheel position at start of delivery of cylinder No. 6.

REMARKS (Continued)

5) = U/actual value min.: U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

BOSCH TEST SPECS. IP ASSEMBLY

TEST SHEET : MAC 12.0 k
Edition : 06.93 (7) EN
Type number : 0 412 726 836
Type number : 0 421 890 014
CUSTOMER IDENT. NO.:

Pump : PES 6 P 120 A 720 RS 7204
Regulator : RE 30
IP-ASSEMBLY: 0 402 796 802

Customer-specific details
Customer: MACK
Engine: EM 7 - 250...E 7-350
Output kW: - -
at 1/min:

		Min	Max
Test PREREQUISITES			
Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 011	
Inlet pressure	bar	1.9	2.0
Overflow 1)	l/h	160	170
Calibrating nozzle-holder assembly		1 688 901 101	
Opening pressure	bar	207	210
Perforated plate diameter	mm	0.6	
Test pressure line		1 680 750 008	
Dimensions:			
Outer diameter.	mm	6.0	
x wall thickness	mm	2.0	
x length	mm	600	
TEST SPECIFICATIONS			
Section A -			
Setting values of injection pump			
- Check values denoted by "P"			
- No basic setting. Equal delivery setting under Section C.			
PORT CLOSING			
PC setting cyl.		6	
Test pressure	bar	22	24
Prestroke (from BDC)	mm	3.25	3.35
P Prestroke (from BDC)	mm	3.20	3.40
Control-rod travel	mm	10.3	10.7
Cam sequence		6 - 2 - 4 - 1 - 5 - 3	
PC difference	°CS	60 each	
tolerance +/-	°CS		0.50
P tolerance +/-	°CS		0.75

		Min	Max
PC mark	Cyl.-No.	- 2)	
Pulse wheel position (PC cam)	°CS	0 3)	
Tolerance +/-	°CS		0.20
P Tolerance +/-	°CS		0.75
Section B -			
Actuator test			
- Check values denoted by "P"			
- Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5V			
CONTROL-ROD PICKUP SETTING			
Test speed	1/min	0	
Setting value			
U/actual	V	3.100	
Control-rod travel	mm	12.95	13.05
P Control-rod travel	mm	12.90	13.10
Check value			
U/actual	V	1.700	
Control-rod travel	mm	5.90	6.40
P Control-rod travel	mm	5.85	6.45
Stop position			
U/actual	V	mind.	4)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1
SPEED SENSOR SIGNALS			
- Test with control rod in stop position			
Speed	1/min	60	
pos.amplitude	V	0.8	2.0
P pos.amplitude	V	0.6	3.0
Speed	1/min	600	
Difference Amplitude to Amplitude	V	max. 1.4	

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			Min	Max
Section C - Version 1 5)				
Injection pump with actuator				
- Check values denoted by "P"				
FUEL DELIVERY TEST AND SETTING				
Test point V1				
Speed	1/min		900	
U/actual	V		3.100	
Fuel delivery	cm3/1000str		247.0	249.0
P Fuel delivery	cm3/1000str		244.0	252.0
Dispersion	cm3/1000str			7.0
P Dispersion	cm3/1000str			11.0
Test point L1				
Speed	1/min		325	
U/actual	V		1.230	1.350
Fuel delivery	cm3/1000str		22.0	28.0
Dispersion	cm3/1000str			8.0
P Dispersion	cm3/1000str			12.0
Section C - Version 2 5)				
Injection pump with actuator				
- Check values denoted by "P"				
FUEL DELIVERY TEST AND SETTING				
Test point V1				
Speed	1/min		900	
U/actual	V		3.100	
Fuel delivery	cm3/1000str		244.0	246.0
P Fuel delivery	cm3/1000str		241.0	249.0
Dispersion	cm3/1000str			7.0
P Dispersion	cm3/1000str			11.0
Test point L1				
Speed	1/min		325	
U/actual	V		1.230	1.350
Fuel delivery	cm3/1000str		22.0	28.0
Dispersion	cm3/1000str			8.0
P Dispersion	cm3/1000str			12.0

REMARKS

MACK-No.: 313 GC 5191-P1

Dimension "Y"
(Adjustment flange) 15.6 15.9
(If provided;
adjustment flange was
introduced in the course
of series production).

1) = Setting of overflow at full load (refer to measurement point V1).

2) = No start-of-delivery mark.

3) = Setting of pulse-wheel position at start of delivery of cylinder No. 6.

4) = U/actual value min: U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

5) = Test values of version 1 only apply to fuel-injection pumps with constant-pressure valve 2 418 559 013.

Test values of version 2 only apply to fuel-injection pumps with constant-pressure valve 2 418 559 029.
The last three digits of the order number are stamped on the top collar of the constant-pressure valve.

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BOSCH TEST SPECS. IP ASSEMBLY

TEST SHEET : VOL 10.3 b
Edition : 06.93 (3) EN
Type number : 0 412 826 015
Type number : 0 421 890 010
CUSTOMER IDENT. NO.:

Pump : PE 6 P 120 A 320 RS 8014
Regulator : RE 30
IP-ASSEMBLY: 0 402 896 005

Customer-specific details
Customer: VOLVO (BUS 8885)
Engine:THD 103 KB, KF, TD 103 KB, KF
Output kW: 180, 210
at 1/min:

		Min	Max
Test PREREQUISITES			
Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 064	
Inlet pressure	bar	2.5	2.6
Overflow	l/h	-	-
Calibrating nozzle-holder assembly		1 688 901 103	
Opening pressure	bar	207	210
Perforated plate diameter	mm	0.7	
Test pressure line		1 680 750 008	
Dimensions:			
Outer diameter.	mm	6.0	
x wall thickness	mm	2.0	
x length	mm	600	
TEST SPECIFICATIONS			
Section A -			
Setting values of injection pump			
- Check values denoted by "P"			
- No basic setting. Equal delivery setting under Section C.			
PORT CLOSING			
PC setting cyl.		1	
Test pressure	bar	25	27
Prestroke (from BDC)	mm	2.95	3.05
P Prestroke (from BDC)	mm	2.90	3.10
Control-rod travel	mm	10.0	11.0
Cam sequence		1 - 5 - 3 - 6 - 2 - 4	
PC difference	°CS	60 each	
tolerance +/-	°CS		0.50
P tolerance +/-	°CS		0.75

		Min	Max
PC mark	Cyl.-No.	- 2)	
Pulse wheel position (PC cam)	°CS	0 3)	
Tolerance +/-	°CS		0.20
P Tolerance +/-	°CS		0.75
Section B -			
Actuator test			
- Check values denoted by "P"			
- Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5V			
CONTROL-ROD PICKUP SETTING			
Test speed	1/min	0	
Setting value			
U/actual	V	3.100	
Control-rod travel	mm	12.95	13.05
P Control-rod travel	mm	12.90	13.10
Check value			
U/actual	V	1.70	
Control-rod travel	mm	5.90	6.40
P Control-rod travel	mm	5.85	6.45
Stop position			
U/actual	V	mind. 4)	
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1
SPEED SENSOR SIGNALS			
- Test with control rod in stop position			
Speed	1/min	60	
pos.amplitude	V	0.8	2.0
P pos.amplitude	V	0.6	3.0
Speed	1/min	600	
Difference Amplitude to Amplitude	V	max. 1.4	

Continued on next page

		Min	Max
S e c t i o n C -			
Injection pump with actuator			
- Check values denoted by "P"			
FUEL DELIVERY TEST AND SETTING			
Test point V1			
Speed	1/min	650	
U/actual	V	2.800	
Fuel delivery	cm3/1000str	295.0	297.0
P Fuel delivery	cm3/1000str	292.0	300.0
Dispersion	cm3/1000str		5.0
P Dispersion	cm3/1000str		9.0
Test point L1			
Speed	1/min	300	
U/actual	V	1.340	1.460
Fuel delivery	cm3/1000str	23.0	29.0
Dispersion	cm3/1000str		7.0
P Dispersion	cm3/1000str		11.0

REMARKS

VOLVO-No.: 425 100

Dimension "Y" (Adjustment flange)	15.6	16.1

2) = No start-of-delivery mark.

3) = Setting of pulse-wheel position at start of delivery of cylinder No. 1.

4) = U/actual value min.: U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

BOSCH TEST SPECS. IP ASSEMBLY

TEST SHEET: DEE
Edition: 06.93 (1) EN
Type number: 0 412 726 863
Type number: 0 421 890 014
CUSTOMER IDENT. NO.:

Pump: PES 6 P 120 A 720 RS 7259
Regulator: RE 30
IP-ASSEMBLY 0 402 796 809

Customer-specific details
Customer: JOHN DEERE
Engine: 6101 HRW 11
Output kW: 233
at 1/min: 2100

		Min	Max
Test PREREQUISITES			
Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 077	
Inlet pressure	bar	1.5	1.6
Overflow	l/h	-	-
Calibrating nozzle-holder assembly		1 688 901 103	
Opening pressure	bar	207	210
Perforated plate diameter	mm	0.7	
Test pressure line		1 680 750 015	
Dimensions:			
Outer diameter.	mm	6.0	
x wall thickness	mm	1.5	
x length	mm	600	
TEST SPECIFICATIONS			
Section A -			
Setting values of injection pump			
- Check values denoted by "P"			
- No basic setting. Equal delivery setting under Section C.			
PORT CLOSING 1)			
PC setting cyl.		1	
Test pressure	bar	25	27
Prestroke (from BDC)	mm	3.55	3.65
P Prestroke (from BDC)	mm	3.50	3.70
Control-rod travel	mm	9.00	12.0
Cam sequence 1 - 5 - 3 - 6 - 2 - 4			
PC difference °CS		60 each	
tolerance +/-°CS			0.50
P tolerance +/-°CS			0.75

		Min	Max
PC mark	Cyl.-No.	- 2)	
Pulse wheel position (PC cam)	°CS	0 3)	
Tolerance +/-°CS			0.20
P Tolerance +/-°CS			0.75
Section B -			
Actuator test			
- Check values denoted by "P"			
- Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5V			
CONTROL-ROD PICKUP SETTING			
Test speed	1/min	0	
Setting value			
U/actual	V	3.100	
Control-rod travel	mm	12.95	13.05
P Control-rod travel	mm	12.90	13.10
Check value			
U/actual	V	1.70	
Control-rod travel	mm	5.90	6.40
P Control-rod travel	mm	5.85	6.45
Stop position			
U/actual	V	mind.	4)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1
SPEED SENSOR SIGNALS			
- Test with control rod in stop position			
Speed	1/min	60	
pos.amplitude	V	0.8	2.0
P pos.amplitude	V	0.6	3.0
Speed	1/min	600	
Difference Amplitude to Amplitude	V	max. 1.4	

Continued on next page

		Min	Max
Section C -			
Injection pump with actuator			
- Check values denoted by "P"			
FUEL DELIVERY TEST AND SETTING			
Test point V1			
Speed	1/min	1050	
U/actual	V	2.840	
Fuel delivery	cm3/1000str	212.0	214.0
P Fuel delivery	cm3/1000str	210.0	216.0
Dispersion	cm3/1000str		5.0
P Dispersion	cm3/1000str		9.0
Test point L1			
Speed	1/min	250	
U/actual	V	1.530	1.650
Fuel delivery	cm3/1000str	23.0	29.0
Dispersion	cm3/1000str		6.0
P Dispersion	cm3/1000str		10.0

REMARKS

JOHN DEERE : RE 42 302

Dimension "Y" (Adjustment flange)		15.6	16.1

2) = Flow begin-incipient fissure 8.75 degrees NW after flow begin cylinder 1.
Incipient fissure over clutch and indicator.
Incipient fissure measured at 62...68 degrees to vertical axis of pump.

3) = Setting of pulse-wheel position at flow begin

4) = U/actual value min:
U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

BOSCH TEST SPECS. IP ASSEMBLY

Pump : PES 6 P 120 A 720 RS 3184
Regulator : RE 24
IP-ASSEMBLY: 0 402 196 702

TEST SHEET : DEE 7.7 m
Edition : 06.93 (2) EN
Type number : 0 412 026 727
Type number : 0 421 890 006
CUSTOMER IDENT. NO.:

Customer-specific details
Customer: JOHN DEERE
Engine: 6076 HH030, HRW30
Output kW:
at 1/min:

		Min	Max
Test PREREQUISITES			
Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 057	
Inlet pressure	bar	1.5	1.6
Overflow	l/h	-	-
Calibrating nozzle-holder assembly		1 688 901 101	
Opening pressure	bar	207	210
Perforated plate diameter	mm	0.6	
Test pressure line		1 680 750 015	
Dimensions:			
Outer diameter.	mm	6.0	
x wall thickness	mm	1.5	
x length	mm	600	
TEST SPECIFICATIONS			
Section A -			
Setting values of injection pump			
- Check values denoted by "P"			
- No basic setting. Equal delivery setting under Section C.			
PORT CLOSING			
PC setting cyl.		1	
Test pressure	bar	25	27
Prestroke (from BDC)	mm	3.55	3.65
P Prestroke (from BDC)	mm	3.50	3.70
Control-rod travel	mm	9.0	12.0
Cam sequence		1 - 5 - 3 - 6 - 2 - 4	
PC difference	°CS	60 each	
tolerance +/-	°CS		0.50
P tolerance +/-	°CS		0.75

		Min	Max
PC mark	Cyl.-No.	1	2)
Pulse wheel position (PC cam)	°CS	10.5	3)
Tolerance +/-	°CS		1.70
P Tolerance +/-	°CS		2.25

Section B -

Actuator test
- Check values denoted by "P"
- Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5 V

CONTROL-ROD PICKUP SETTING

Test speed	1/min	0	
Setting value			
U/actual	V	3.100	
Control-rod travel	mm	12.95	13.05
P Control-rod travel	mm	12.90	13.10
Check value			
U/actual	V	1.700	
Control-rod travel	mm	5.90	6.40
P Control-rod travel	mm	5.85	6.45
Stop position			
U/actual	V	mind.	4)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1

SPEED SENSOR SIGNALS

- Test with control rod in stop position

Speed	1/min	60	
pos.amplitude	V	0.8	2.0
P pos.amplitude	V	0.6	3.0
Speed	1/min	600	
Difference Amplitude to Amplitude	V	max. 1.4	

Continued on next page

			Min	Max
S e c t i o n C -				
Injection pump with actuator				
- Check values denoted by "P"				
FUEL DELIVERY TEST AND SETTING				
Test point V1				
Speed	1/min		1100	
U/actual	V		2.710	
Fuel delivery	cm3/1000str		140.0	142.0
P Fuel delivery	cm3/1000str		137.0	145.0
Dispersion	cm3/1000str			5.0
P Dispersion	cm3/1000str			9.0
Test point L1				
Speed	1/min		425	
U/actual	V		1.340	1.460
delivery	cm3/1000str		18.0	24.0
Dispersion	cm3/1000str			6.0
P Dispersion	cm3/1000str			10.0

REMARKS

Dimension "Y"
(Adjustment flange)

2) = Port-closing mark 10.5° camshaft after port closing of cylinder 1.

3) = Pulse wheel position 10.5° camshaft after port closing of cylinder 1.

4) = U/actual value min.: U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

BOSCH TEST SPECS. IP ASSEMBLY

Pump : PES 6 P 120 A 720 RS 7240
Regulator : RE 30
IP-ASSEMBLY: 0 402 796 806

TEST SHEET : UNI 9.5 j
Edition : 06.93 (2) EN
Type number : 0 412 726 855
Type number : 0 421 890 013
CUSTOMER IDENT. NO.:

Customer-specific details
Customer: IVECO - UNIC
Engine: 8460.41.5020
Output kW:
at 1/min:

		Min	Max
Test PREREQUISITES			
Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 025	
Inlet pressure	bar	1.5	1.6
Overflow	l/h	-	-
Calibrating nozzle-holder assembly		1 688 901 105	
Opening pressure	bar	207	210
Perforated plate diameter	mm	0.8	
Test pressure line		1 680 750 008	
Dimensions:			
Outer diameter.	mm	6.0	
x wall thickness	mm	2.0	
x length	mm	600	
TEST SPECIFICATIONS			
Section A -			
Setting values of injection pump			
- Check values denoted by "P"			
- No basic setting. Equal delivery setting under Section C.			

PORT CLOSING

PC setting cyl.		1	
Test pressure	bar	25	27
Prestroke (from BDC)	mm	5.10	5.20
P Prestroke (from BDC)	mm	5.05	5.25
Control-rod travel	mm	9.0	12.0
Cam sequence 1 - 5 - 3 - 6 - 2 - 4			
PC difference	°CS	60 each	
tolerance +/-	°CS		0.50
P tolerance +/-	°CS		0.75

		Min	Max
PC mark	Cyl.-No.	- 2)	
Pulse wheel position (PC cam)	°CS	0 3)	
Tolerance +/-	°CS		0.20
P Tolerance +/-	°CS		0.75

Section B -

Actuator test
- Check values denoted by "P"
- Assembly warm-up time: 3 mins. at n = 600 1/min, RPM actual = 2.5 V

CONTROL-ROD PICKUP SETTING

Test speed	1/min	0	
Setting value			
RPM actual	V	3.100	
Control-rod travel	mm	12.95	13.05
P Control-rod travel	mm	12.90	13.10
Check value			
RPM actual	V	1.700	
Control-rod travel	mm	5.90	6.40
P Control-rod travel	mm	5.85	6.45
Stop position			
RPM actual	V	mind.	4)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1

SPEED SENSOR SIGNALS

- Test with control rod in stop position

Speed	1/min	60	
pos.amplitude	V	0.8	2.0
P pos.amplitude	V	0.6	3.0
Speed	1/min	600	
Difference Amplitude to Amplitude	V	max. 1.4	

Continued on next page

B 19

			Min	Max
S e c t i o n C -				
Injection pump with actuator				
- Check values denoted by "P"				
FUEL DELIVERY TEST AND SETTING				
	Test point V1			
	Speed	1/min	1050	
	RPM actual	V	2.900	
	Fuel delivery	cm3/1000str	260.0	262.0
P	Fuel delivery	cm3/1000str	257.0	265.0
	Dispersion	cm3/1000str		5.0
P	Dispersion	cm3/1000str		9.0
	Test point L1			
	Speed	1/min	275	
	RPM actual	V	1.520	1.640
	Fuel delivery	cm3/1000str	45.0	51.0
	Dispersion	cm3/1000str		8.0
P	Dispersion	cm3/1000str		12.0
REMARKS				
	Dimension "Y" (Adjustment flange)		15.6	16.1

2) = No start-of-delivery mark.

3) = Setting of pulse-wheel position at start of delivery of cylinder No. 1.

4) = RPM actual value min.: RPM actual minimum value with deenergized servo magnet and control rod in shutoff position.

BOSCH TEST SPECS. IP ASSEMBLY

TEST SHEET : MAN 12.0 a
Edition : 06.93 (2) EN

Pump : PES 6 P 120 A 720/3 LS 7221 Type number : 0 412 726 841
Regulator : RE 30 Type number : 0 421 890 007
IP-ASSEMBLY: 0 402 796 803 CUSTOMER IDENT. NO.:

Customer-specific details
Customer: MAN
Engine: D 2866 LF 10
Output kW:
at 1/min:

		Min	Max
Test PREREQUISITES			
Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 025	
Inlet pressure	bar	1.5	1.6
Overflow	l/h	-	-
Calibrating nozzle-holder assembly		1 688 901 105	
Opening pressure	bar	207	210
Perforated plate diameter	mm	0.8	
Test pressure line		1 680 750 015	
Dimensions:			
Outer diameter.	mm	6.0	
x wall thickness	mm	1.5	
x length	mm	600	
TEST SPECIFICATIONS			
Section A -			
Setting values of injection pump			
- Check values denoted by "P"			
- No basic setting. Equal delivery setting under Section C.			
PORT CLOSING 1)			
PC setting cyl.		6	
Test pressure	bar	25	27
Prestroke (from BDC)	mm	4.80	4.90
P Prestroke (from BDC)	mm	4.75	4.95
Control-rod travel	mm	15.0	16.0
Cam sequence		6 - 2 - 4 - 1 - 5 - 3	
PC difference	°CS	60 each	
tolerance +/-	°CS		0.50
P tolerance +/-	°CS		0.75

		Min	Max
PC mark	Cyl.-No.	- 2)	
Pulse wheel position (PC cam)	°CS	0 3)	
Tolerance +/-	°CS		0.20
P Tolerance +/-	°CS		0.75
Section B -			
Actuator test			
- Check values denoted by "P"			
- Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5 V			
CONTROL-ROD PICKUP SETTING			
Test speed	1/min	0	
Setting value			
U/actual	V	3.100	
Control-rod travel	mm	12.95	13.05
P Control-rod travel	mm	12.90	13.10
Check value			
U/actual	V	1.700	
Control-rod travel	mm	5.90	6.40
P Control-rod travel	mm	5.85	6.45
Stop position			
U/actual	V	mind.	4)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1
SPEED SENSOR SIGNALS			
- Test with control rod in stop position			
Speed	1/min	60	
pos.amplitude	V	0.8	2.0
P pos.amplitude	V	0.6	3.0
Speed	1/min	600	
Difference Amplitude to Amplitude	V	max. 1.4	

Continued on next page

3/16

			Min	Max
S e c t i o n C -				
Injection pump with actuator				
- Check values denoted by "P"				
FUEL DELIVERY TEST AND SETTING				
Test point V1				
Speed	1/min		1000	
U/actual	V		3.120	
Fuel delivery	cm3/1000str		263.0	265.0
P Fuel delivery	cm3/1000str		260.0	268.0
Dispersion	cm3/1000str			5.0
P Dispersion	cm3/1000str			9.0
Test point L1				
Speed	1/min		300	
U/actual	V		1.330	1.450
Fuel delivery	cm3/1000str		13.0	19.0
Dispersion	cm3/1000str			8.0
P Dispersion	cm3/1000str			12.0

REMARKS

MAN-No.: 3-7101

Dimension "Y" (Adjustment flange)		15.6	16.1

1) = Note additional test "Start-of-delivery difference":

Between	CRT mm	4.40	4.60
and	CRT mm	15.0	16.0
Difference	°CS	1.75	3.25

2) = No start-of-delivery mark.

3) = Setting of pulse-wheel position at start of delivery of cylinder No. 6.

4) = U/actual value min.: U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

BOSCH TEST SPECS. IP ASSEMBLY

TEST SHEET: MAN 12.0 a 1
Edition: 06.93 (3) EN

Pump: PES 6 P 120 A 720/3 LS 7221
Regulator: RE 30
IP-ASSEMBLY 0 402 796 804

Type number: 0 412 726 841
Type number: 0 421 890 012
CUSTOMER IDENT. NO.:

Customer-specific details
Customer: MAN
Engine: D 2866 LF 10
Output kW:
at 1/min:

		Min	Max
Test PREREQUISITES			
Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 025	
Inlet pressure	bar	1.5	1.6
Overflow	l/h	-	-
Calibrating nozzle-holder assembly		1 688 901 105	
Opening pressure	bar	207	210
Perforated plate diameter	mm	0.8	
Test pressure line		1 680 750 015	
Dimensions:			
Outer diameter.	mm	6.0	
x wall thickness	mm	1.5	
x length	mm	600	

TEST SPECIFICATIONS

Section A -

Setting values of injection pump
- Check values denoted by "P"
- No basic setting. Equal delivery setting under Section C.

PORT CLOSING 1)

PC setting cyl.		6	
Test pressure	bar	25	27
Prestroke (from BDC)	mm	4.80	4.90
P Prestroke (from BDC)	mm	4.75	4.95
Control-rod travel	mm	15.0	16.0
Cam sequence 6 - 2 - 4 - 1 - 5 - 3			
PC difference °CS		60 each	
tolerance +/-°CS			0.50
P tolerance +/-°CS			0.75

	Min	Max
PC mark Cyl.-No.	- 2)	
Pulse wheel position (PC cam) °CS	0 3)	
Tolerance +/-°CS		0.20
P Tolerance +/-°CS		0.75

Section B -

Actuator test
- Check values denoted by "P"
- Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5V

CONTROL-ROD PICKUP SETTING

Test speed	1/min	0	
Setting value			
U/actual	V	3.100	
Control-rod travel	mm	12.95	13.05
P Control-rod travel	mm	12.90	13.10
Check value			
U/actual	V	1.70	
Control-rod travel	mm	5.90	6.40
P Control-rod travel	mm	5.85	6.45
Stop position			
U/actual	V	mind.	4)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1

SPEED SENSOR SIGNALS

- Test with control rod in stop position

Speed	1/min	60	
pos.amplitude	V	0.8	2.0
P pos.amplitude	V	0.6	3.0
Speed	1/min	600	
Difference Amplitude to Amplitude	V	max. 1.4	

Continued on next page

		Min	Max
Section C -			
Injection pump with actuator			
- Check values denoted by "P"			
FUEL DELIVERY TEST AND SETTING			
Test point V1			
Speed	1/min	1000	
U/actual	V	3.120	
Fuel delivery	cm3/1000str	263.0	265.0
P Fuel delivery	cm3/1000str	260.0	268.0
Dispersion	cm3/1000str		5.0
P Dispersion	cm3/1000str		9.0
Test point L1			
Speed	1/min	300	
U/actual	V	1.380	1.500
Fuel delivery	cm3/1000str	13.0	19.0
Dispersion	cm3/1000str		8.0
P Dispersion	cm3/1000str		12.0
REMARKS			
MAN-NR.: 51.22203-7184			
Dimension "Y" (Adjustment flange)		15.6	16.1
1) = Note additional test "Start-of-delivery difference":			
Between	CRT mm	4.40	4.60
and	CRT mm	15.0	16.0
Difference	°CS	1.75	3.25
2) = No start-of-delivery mark.			
3) = Setting of pulse-wheel position at start of delivery of cylinder No. 1.			
4) = U/actual value min: U/actual minimum value with deenergized servo magnet and control rod in shutoff position.			

BOSCH TEST SPECS. IP ASSEMBLY

TEST SHEET : SCA 14.2 o
Edition : 06,93 (5) EN
Type number : 0 412 628 845
Type number : 0 421 890 007
CUSTOMER IDENT. NO.:

Pump : PE 8 P 120 A 920/4 LS 7205
Regulator : RE 30
IP-ASSEMBLY: 0 402 698 804

Customer-specific details
Customer: SCANIA
Engine: DSC 1409
Output kW:
at 1/min:

		Min	Max
Test PREREQUISITES			
Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 025	
Inlet pressure	bar	1.5	1.6
Overflow	l/h	-	-
Calibrating nozzle-holder assembly		1 688 901 104	
Opening pressure	bar	250	253
Perforated plate diameter	mm	0.7	
Test pressure line		1 680 750 008	
Dimensions:			
Outer diameter.	mm	6.0	
x wall thickness	mm	2.0	
x length	mm	600	
TEST SPECIFICATIONS			
Section A -			
Setting values of injection pump			
- Check values denoted by "P"			
- No basic setting. Equal delivery setting under Section C.			
PORT CLOSING			
PC setting cyl.		1	
Test pressure	bar	25	27
Prestroke (from BDC)	mm	5.00	5.10
P Prestroke (from BDC)	mm	4.95	5.15
Control-rod travel	mm	10.0	11.0
Cam sequence		1-2-7-3-4-5-6-8	
PC difference	°CS	45 each	
tolerance +/-	°CS		0.50
P tolerance +/-	°CS		0.75
		Min	Max
PC mark Cyl.-No.		1 2)	
Pulse wheel position (PC cam)	°CS	0 3)	
Tolerance +/-	°CS		0.20
P Tolerance +/-	°CS		0.75
Section B -			
Actuator test			
- Check values denoted by "P"			
- Assembly warm-up time: 3 mins. at n = 600 1/min, RPM actual = 2.5 V			
CONTROL-ROD PICKUP SETTING			
Test speed	1/min	0	
Setting value			
RPM actual	V	3.100	
Control-rod travel	mm	12.95	13.05
P Control-rod travel	mm	12.90	13.10
Check value			
RPM actual	V	1.700	
Control-rod travel	mm	5.90	6.40
P Control-rod travel	mm	5.85	6.45
Stop position			
RPM actual	V	mind.	4)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1
SPEED SENSOR SIGNALS			
- Test with control rod in stop position			
Speed	1/min	60	
pos.amplitude	V	0.8	2.0
P pos.amplitude	V	0.6	3.0
Speed	1/min	600	
Difference Amplitude to Amplitude	V	max. 1.4	

Continued on next page

B20

B20

		Min	Max
S e c t i o n C -			
Injection pump with actuator			
- Check values denoted by "P"			
FUEL DELIVERY TEST AND SETTING (Observe "Remarks" Point 5))			
Test point V1			
Speed	1/min	700	
RPM actual	V	3.000	
Fuel delivery	cm3/1000str	247.0	249.0
P Fuel delivery	cm3/1000str	244.0	252.0
Dispersion	cm3/1000str		8.0
P Dispersion	cm3/1000str		12.0
Test point L1			
Speed	1/min	250	
RPM actual	V	1.350	1.470
Fuel delivery	cm3/1000str	10.0	16.0
Dispersion	cm3/1000str		4.0
P Dispersion	cm3/1000str		8.0

REMARKS

SCANIA-No.: 1 303 800

Dimension "Y" (Adjustment flange) (If provided; adjustment flange was introduced in the course of series production)	15.6	16.1

2) = Start of delivery mark at start of delivery of cylinder No 1.

3) = Setting of pulse-wheel position at start of delivery of cylinder No. 1.

4) = RPM actual value min.: RPM actual minimum value with deenergized servo magnet and control rod in shutoff position.

REMARKS (Continued)

5) = Feed rate checking and adjustment with ROBO diaphragm. Connection of the ROBO diaphragm: Pump page 2, front.

B9 1

BOSCH TEST SPECS. IP ASSEMBLY

TEST SHEET : MAC 12.0 n
Edition : 06.93 (5) EN
Type number : 0 412 726 847
Type number : 0 421 890 014
CUSTOMER IDENT. NO.:

Pump : PES 6 P 120 A 720 RS 7235
Regulator : RE 30
IP-ASSEMBLY: 0 402 796 805

Customer-specific details
Customer: MACK
Engine: E 7-350
Output kW: - -
at 1/min:

		Min	Max
Test PREREQUISITES			
Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 011	
Inlet pressure	bar	1.9	2.0
Overflow 1)	l/h	160	170
Calibrating nozzle-holder assembly		1 688 901 101	
Opening pressure	bar	207	210
Perforated plate diameter	mm	0.6	
Test pressure line		1 680 750 008	
Dimensions:			
Outer diameter.	mm	6.0	
x wall thickness	mm	2.0	
x length	mm	600	
TEST SPECIFICATIONS			
Section A -			
Setting values of injection pump			
- Check values denoted by "P"			
- No basic setting. Equal delivery setting under Section C.			
PORT CLOSING			
PC setting cyl.		6	
Test pressure	bar	22	24
Prestroke (from BDC)	mm	3.25	3.35
P Prestroke (from BDC)	mm	3.20	3.40
Control-rod travel	mm	10.3	10.7
Cam sequence		6 - 2 - 4 - 1 - 5 - 3	
PC difference	°CS	60 each	
tolerance +/-	°CS		0.50
P tolerance +/-	°CS		0.75

		Min	Max
PC mark	Cyl.-No.	- 2)	
Pulse wheel position (PC cam)	°CS	0 3)	
Tolerance +/-	°CS		0.20
P Tolerance +/-	°CS		0.75

Section B -

Actuator test
- Check values denoted by "P"
- Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5V

CONTROL-ROD PICKUP SETTING

Test speed	1/min	0	
Setting value			
U/actual	V	3.100	
Control-rod travel	mm	12.95	13.05
P Control-rod travel	mm	12.90	13.10
Check value			
U/actual	V	1.700	
Control-rod travel	mm	5.90	6.40
P Control-rod travel	mm	5.85	6.45
Stop position			
U/actual	V	mind.	4)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1

SPEED SENSOR SIGNALS

- Test with control rod in stop position

Speed	1/min	60	
pos.amplitude	V	0.8	2.0
P pos.amplitude	V	0.6	3.0
Speed	1/min	600	
Difference Amplitude to Amplitude	V	max. 1.4	

Continued on next page

			Min	Max
S e c t i o n C -				
Injection pump with actuator				
- Check values denoted by "P"				
FUEL DELIVERY TEST AND SETTING				
Test point V1				
Speed	1/min		900	
U/actual	V		3.100	
Fuel delivery	cm3/1000str		244.0	246.0
P Fuel delivery	cm3/1000str		241.0	249.0
Dispersion	cm3/1000str			7.0
P Dispersion	cm3/1000str			11.0
Test point L1				
Speed	1/min		325	
U/actual	V		1.230	1.350
Fuel delivery	cm3/1000str		22.0	28.0
Dispersion	cm3/1000str			8.0
P Dispersion	cm3/1000str			12.0

REMARKS

MACK-No.: 313 GC 5201-P1

Dimension "Y" (Adjustment flange)	15.6		15.9

1) = Setting of overflow at full load (refer to measurement point V1).

2) = No start-of-delivery mark.

3) = Setting of pulse-wheel position at start of delivery of cylinder No. 6.

4) = U/actual value min: U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

C1

BOSCH TEST SPECS. IP ASSEMBLY

Pump: PES 6 P 120 A 720 RS 7245
Regulator: RE 30
IP-ASSEMBLY: 0 402 796 807

TEST SHEET : MAC
Edition : 06.93 (5) EN
Type number : 0 412 726 858
Type number : 0 421 890 015
CUSTOMER IDENT. NO.:

Customer-specific details
Customer: MACK
Engine: E 7 - 350
Output kW: - -
at 1/min:

		Min	Max
Test PREREQUISITES			
Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 011	
Inlet pressure	bar	1.9	2.0
Overflow 1)	l/h	160	170
Calibrating nozzle-holder assembly		1 688 901 101	
Opening pressure	bar	207	210
Perforated plate diameter	mm	0.6	
Test pressure line		1 680 750 008	
Dimensions:			
Outer diameter.	mm	6.0	
x wall thickness	mm	2.0	
x length	mm	600	
TEST SPECIFICATIONS			

Section A -
Setting values of injection pump
- Check values denoted by "P"
- No basic setting. Equal delivery setting under Section C.

PORT CLOSING

PC setting cyl.		6	
Test pressure	bar	22	24
Prestroke (from BDC)	mm	3.25	3.35
P Prestroke (from BDC)	mm	3.20	3.40
Control-rod travel	mm	10.3	10.7
Cam sequence		6 - 2 - 4 - 1 - 5 - 3	
PC difference	°CS	60 each	
tolerance +/-	°CS		0.50
P tolerance +/-	°CS		0.75

		Min	Max
PC mark	Cyl.-No.	- 2)	
Pulse wheel position (PC cam)	°CS	0 3)	
Tolerance +/-	°CS		0.20
P Tolerance +/-	°CS		0.75

Section B -

Actuator test
- Check values denoted by "P"
- Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5V

CONTROL-ROD PICKUP SETTING

Test speed	1/min	0	
Setting value			
U/actual	V	3.100	
Control-rod travel	mm	12.95	13.05
P Control-rod travel	mm	12.90	13.10
Check value			
U/actual	V	1.700	
Control-rod travel	mm	5.90	6.40
P Control-rod travel	mm	5.85	6.45
Stop position			
U/actual	V	mind.	4)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1

SPEED SENSOR SIGNALS

- Test with control rod in stop position

Speed	1/min	60	
pos.amplitude	V	0.8	2.0
P pos.amplitude	V	0.6	3.0
Speed	1/min	600	
Difference Amplitude to Amplitude	V	max. 1.4	

Continued on next page

C2

C2

			Min	Max
S e c t i o n C -				
Injection pump with actuator				
- Check values denoted by "P"				
FUEL DELIVERY TEST AND SETTING				
Test point V1				
Speed	1/min		900	
U/actual	V		3.100	
Fuel delivery	cm3/1000str		244.0	246.0
P Fuel delivery	cm3/1000str		241.0	249.0
Dispersion	cm3/1000str			7.0
P Dispersion	cm3/1000str			11.0
Test point L1				
Speed	1/min		325	
U/actual	V		1.230	1.350
Fuel delivery	cm3/1000str		22.0	28.0
Dispersion	cm3/1000str			8.0
P Dispersion	cm3/1000str			12.0

REMARKS

MACK-No.: 313 GC 5204-P1

Dimension "Y" (Adjustment flange) (If provided; adjustement flange was introduced in the course of series production)	15.6	15.9

1) = Setting of overflow at full load (refer to measurement point V1).

2) = No start-of-delivery mark.

3) = Setting of pulse-wheel position at start of delivery of cylinder No. 6.

4) = U/actual value min: U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

C3

BOSCH TEST SPECS. IP ASSEMBLY

TEST SHEET: MAN
Edition: 06.93 (2) EN

Pump: PES 6 P 120 A 720/3 LS 7252 Type number: 0 412 726 861
Regulator: RE 30 Type number: 0 421 890 012
IP-ASSEMBLY 0 402 796 808 CUSTOMER IDENT. NO.:

Customer-specific details
Customer: MAN
Engine: D 2866 LF 10
Output kW: 309
at 1/min:

		Min	Max
Test PREREQUISITES			
Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 025	
Inlet pressure	bar	1.5	1.6
Overflow	l/h	-	-
Calibrating nozzle-holder assembly		1 688 901 105	
Opening pressure	bar	207	210
Perforated plate diameter	mm	0.8	
Test pressure line		1 680 750 015	
Dimensions:			
Outer diameter.	mm	6.0	
x wall thickness	mm	1.5	
x length	mm	600	
TEST SPECIFICATIONS			
Section A -			
Setting values of injection pump			
- Check values denoted by "P"			
- No basic setting. Equal delivery setting under Section C.			

PORT CLOSING 1)

PC setting cyl.		6	
Test pressure	bar	25	27
Prestroke (from BDC)	mm	4.80	4.90
P Prestroke (from BDC)	mm	4.75	4.95
Control-rod travel	mm	15.0	16.0
Cam sequence		6 - 2 - 4 - 1 - 5 - 3	
PC difference	°CS	60 each	
tolerance +/-	°CS		0.50
P tolerance +/-	°CS		0.75

		Min	Max
PC mark	Cyl.-No.	- 2)	
Pulse wheel position (PC cam)	°CS	0 3)	
Tolerance +/-	°CS		0.20
P Tolerance +/-	°CS		0.75

Section B -

Actuator test
- Check values denoted by "P"
- Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5V

CONTROL-ROD PICKUP SETTING

Test speed	1/min	0	
Setting value			
U/actual	V	3.100	
Control-rod travel	mm	12.95	13.05
P Control-rod travel	mm	12.90	13.10
Check value			
U/actual	V	1.70	
Control-rod travel	mm	5.90	6.40
P Control-rod travel	mm	5.85	6.45
Stop position			
U/actual	V	mind.	4)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1

SPEED SENSOR SIGNALS

- Test with control rod in stop position

Speed	1/min	60	
pos.amplitude	V	0.8	2.0
P pos.amplitude	V	0.6	3.0
Speed	1/min	600	
Difference Amplitude to Amplitude	V	max. 1.4	

Continued on next page

		Min	Max

Section C -

Injection pump with actuator

- Check values denoted by "P"

FUEL DELIVERY TEST AND SETTING

	Test point V1			
	Speed	1/min	1000	
	U/actual	V	3.120	
	Fuel delivery	cm3/1000str	263.0	265.0
P	Fuel delivery	cm3/1000str	260.0	268.0
	Dispersion	cm3/1000str		5.0
P	Dispersion	cm3/1000str		9.0
	Test point L1			
	Speed	1/min	300	
	U/actual	V	1.380	1.500
	Fuel delivery	cm3/1000str	13.0	19.0
	Dispersion	cm3/1000str		8.0
P	Dispersion	cm3/1000str		12.0

REMARKS

MAN-NR.: 51.22203-7210

Dimension "Y" (Adjustment flange)		15.6	16.1
1) = Note additional test "Start-of-delivery difference":			
	Between CRT mm	6.40	6.60
	and CRT mm	15.0	16.0
	Difference °CS	1.75	3.25

2) = No start-of-delivery mark.

3) = Setting of pulse-wheel position at start of delivery of cylinder No. 6.

4) = U/actual value min: U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

BOSCH INJECTION PUMP TEST SPECIFICATIONS

Obsereve notes in remark colum

Test sheet : Audi
Date of manufacture:
Edition : 30.04.1992
Replaces :
Test oil : ISO 4113

Injection pump : VE5/11E2300L400

Type No. : 0 460 415 998
Customer Ident.No. :

Customer-specific details
Customer :Audi

Engine : 180-02-TDI-C4

Output kW :
Speed 1/min :

TEST BENCH PREREQUISITES

Inlet pressure, bar : 0,30...0,40

Calibrating nozzle-
holder assembly > : 1 688 901 114

Opening
pressure > bar : 207...210

Test pressure line : 1 680 750 085

Outer diameter : 6,00
x wall thickness > : 2,20
x length > mm : 350

Overflow valve : 2 467 413 006

Test line : 0 986 612 432
(fuel-delivery
actuator) : (KDEP 1865/3)

Test line : 0 986 612 435
(solenoid valve start
of injection) : (KDEP 1865/6)

TEST PRECONDITIONS

Test oil
return temp. > °C
with thermometer : 55

Test oil supply
temperature > °C : 42...47

Hold-up
revolutions >1/min : 1200
Feedback
voltage mV : 2500

ELECTRICAL TEST

Actuator
Connections 4 and 7
Test temperature:
15°...30°C, ohms : 0,4...1,0
50°...70°C, ohms : 0,45...1,1

Connections 4 and.
ground, Mohms min. : 1,0
Connections 7 and
ground, Mohms min. : 1,0
Connections 2 and 7
Mohms min. : 1,0
Connections 4 and 6
Mohms min. : 1,0

Control-collar travel sensor
Test temperature :
15°...70°C
Connections 2 and 3
kohms : 1,0...3,0
Connections 1 and 3
kohms : 0,5...2,0

Connections 1 and.
ground, Mohms min. : 1,0
Connections 2 and
ground, Mohms min. : 1,0
Connections 3 and
ground, Mohms min. : 1,0

Temperature sensor, fuel
Connentions 5 and 6
Test temperature:
15°...30°C, kohms : 1,2...4,0
50°...70°C, kohms : 0,3...1,2

Connections 5 and
ground, Mohms min. : 1,0
Connections 6 and
ground Mohms min. : 1,0

Solenoid valve, start of injection
Connections 1 and 2
Test temperature :
15°...30°C, ohms : 14,3...17,3
50°...70°C, ohms : 15,5...21,0

Starting stop mV : 4120...4650

Shutoff stop mV : 650...850

C6

CG

Setting values of injection pump
Check values in brackets

Supply pump pressure:

Speed	1/min	: 750
Checkbk. volt. mV		: 3900
Setting value, bar		: 6,2...7,2

Timing device travel:

Speed	1/min	: 750
Checkbk. volt mV		: 3900
Setting value, mm		: 9,70...9,90

Full-load delivery :

1st temperature-conditioning revolution	1/min	: 2125
Checkbk. volt mV		: 2500
Output temperature °C		: 61
Speed	1/min	: 750
Checkbk. volt mV		: 2440
Measuring temperature °C		: 57
Fuel delivery	cm³/ 1000s	: 39,3...39,7
Dispersion >	cm³/ 1000s	: 2,5 :

Test specifications of injection pump
Check values in brackets

Supply pump pressure variations:

1st speed	1/min	: 2125
Checkbk. volt mV		: 3900
Supply pump pressure >	bar	: 8,1...9,1
>	bar	:

Timing device variations:

1st speed	1/min	: 500
Checkbk. volt. mV		: 3900
Timing device travel	mm	: 7,8...10,2
>	mm	: (7,5...11,5)
2nd speed	1/min	: 750
Checkbk. volt. mV		: 3900
Timing device travel	mm	:
>	mm	: (9,4...11,2)
3rd speed	1/min	: 1000
Checkbk. volt. mV		: 1800
Timing device travel	mm	: max. 0,3
>	mm	: (max. 1,0)
Solenoid valve Start of injection,	volts	: 12
4.th speed	1/min	: 2125
Checkbk. volt. mV		: 3900
Timing device travel	mm	: 11,6...12,6
>	mm	: (11,5...12,7)

Overflow at overflow valve:

1st temperature-conditioning revolution	1/min	: 100
Checkbk. volt. mV		: 2500
Output temperature °C		: 51
Speed	1/min	: 2125
Checkbk. volt. mV		: 3900
Measuring temperature °C		: 53
Overflow		: 40...60
>	cm³/10	: (35...65)

C7

C7

Fuel delivery variations:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt mV : 2500
Output
temperature °C : 51
Speed 1/min : 2125
Checkbk. volt mV : 3900
Meßtemperatur °C : 53
Fuel delivery cm³/ : 54,2...56,8
> 1000s : (53,0...58,0)
Dispersion cm³/ : 3,0
> 1000s. : (5,0)

2nd temperature-conditioning
revolution 1/min : 2125
Checkbk. volt mV : 2500
Output
temperature °C : 60
Speed 1/min : 1000
Checkbk. volt mV : 3200
Measuring
temperature °C : 56
Fuel delivery cm³/ : 55,7...58,3
> 1000s : (54,5...59,5)
Dispersion cm³/ : 2,5
> 1000s : (4,0)

3rd temperature-conditioning
revolution 1/min : 2125
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 750
Checkbk. volt mV : 2440
Measuring
temperature °C : 57
Fuel delivery cm³/ :
> 1000s : (37,5...41,5)
Dispersion cm³/ :
> 1000s :

4th temperature-conditioning
revolution 1/min : 2125
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 500
Checkbk. volt mV : 2300
Measuring
temperature °C : 57
Fuel delivery cm³/ : 40,2...42,8
> 1000s : (39,2...43,8)
Dispersion cm³/ : 3,0
> 1000s :

Idle delivery:

1st temperature-conditioning
revolution 1/min : 2125
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 500
Checkbk. volt mV : 1570
Meßtemperatur °C : 57
Fuel delivery cm³/ : 7,2...12,2
> 1000s : (5,2...14,2)
Solenoid valve
Start of
injection, volts : 12
Dispersion cm³/ : 3,5
> 1000s : (5,0)

Starting fuel delivery:
1st temperature-conditioning
revolution 1/min : 2125
Checkbk. volt mV : 2500
Output
temperature °C : 65
Speed 1/min : 100
Checkbk. volt mV : 2900
Measuring
temperature °C : 61
Fuel delivery cm³/ :
> 1000s : 74,0
Solenoid valve
Start of
injection, volts : 12

Stop test:
Speed 1/min : 1100
Checkbk. volt mV : 4125
ELAB volts : 0
Fuel delivery cm³/ :
max. 1000s : 3,0
Start of
injection, volts : 12

Shutoff solenoid:

Cut-in voltage
min.> volts : 10,0
Rated voltage,
volts : 12,0

Notes:

Take note of test instructions "Distributor pump for direct injectors"!

Dimensions for mounting and setting:

Description		
K	mm	: 2.7...2.9
KF	mm	: 6,5...6,9
SVS max.	mm	:
FH	mm	:
TS		: 1 467 010 494

C8

BOSCH INJECTION PUMP TEST SPECIFICATIONS

Obsereve notes in remark colum

Test sheet	: VW
Date of manufacture	:
Edition	: 30.04.1992
Replaces	:
Test oil	: ISO 4113
Injection pump	: VE4/10E2250R440
Type No.	: 0 460 404 993
Customer Ident.No.	:

Customer-specific details

Customer	:VW
Engine	: 028.C
Output kW	:
Speed 1/min	:

TEST BENCH PREREQUISITES

Inlet pressure, bar	: 0.30...0.40
Calibrating nozzle-holder assembly >	: 1 688 901 114
Opening pressure > bar	: 207...210
Test pressure line	: 1 680 750 085
Outer diameter	: 6.00
x wall thickness >	: 2.20
x length > mm	: 350
Overflow valve	: 2 467 413 006
Test line	: 0 986 612 432
(fuel-delivery actuator)	: (KDEP 1865/3)
Test line	: 0 986 611 983
(solenoid valve start of injection)	: (KDEP 1190)

TEST PRECONDITIONS

Test oil return temp. > °C with thermometer	: 55
Test oil supply temperature > °C	: 42...47
Hold-up revolutions >1/min	: 1200
Feedback voltage mV	: 2500

ELECTRICAL TEST

Actuator
Connections 4 and 7
Test temperature:

15°...30°C, ohms	: 0.4...1.0
50°...70°C, ohms	: 0.45...1.1
Connections 4 and. ground, Mohms min.	: 1.0
Connections 7 and ground, Mohms min.	: 1.0
Connections 2 and 7 Mohms min.	: 1.0
Connections 4 and 6 Mohms min.	: 1.0

Control-collar travel sensor

Test temperature	:
15°...70°C	
Connections 2 and 3 kohms	: 1.0...3.0
Connections 1 and 3 kohms	: 0.5...2.0
Connections 1 and. ground, Mohms min.	: 1.0
Connections 2 and ground, Mohms min.	: 1.0
Connections 3 and ground, Mohms min.	: 1.0

Temperature sensor, fuel
Connentions 5 and 6
Test temperature:

15°...30°C, kohms	: 1.2...4.0
50°...70°C, kohms	: 0.3...1.2
Connections 5 and ground, Mohms min.	: 1.0
Connections 6 and ground Mohms min.	: 1.0

Solenoid valve, start of injection
Connections 1 and 2

Test temperature	:
15°...30°C, ohms	: 14.3...17.3
50°...70°C, ohms	: 15.5...21.0
Starting stop mV	: 4120...4650
Shutoff stop mV	: 650...850

C9

C9

Setting values of injection pump
Check values in brackets

Supply pump pressure:

Speed	1/min	: 500
Checkbk. volt.		
mV		: 2245
Setting value, bar		: 6.5...7.1

Timing device travel:

Speed	1/min	: 750
Checkbk. volt		
mV		: 3350
Setting value, mm		: 10.7...10.9

Full-load delivery :

1st temperature-conditioning revolution	1/min	: 2000
Checkbk. volt		
mV		: 2500
Output temperature °C		: 61
Speed	1/min	: 750
Checkbk. volt		
mV		: 2480
Measuring temperature °C		: 57
Fuel delivery	cm³/	
>	1000s	: 38.8...39.2
Dispersion	cm³/	: 4.0
>	1000s	:

Test specifications of injection pump
Check values in brackets

Supply pump pressure variations:

1st speed	1/min	: 2000
Checkbk. volt		
mV		: 3890
Supply pump pressure >	bar	: 9.0...9.6
>	bar	:
1st speed	1/min	: 150
Checkbk. volt		
mV		: 2230
Supply pump pressure >	bar	:
>	bar	: min. 3.5

Timing device variations:

1st speed	1/min	: 500
Checkbk. volt.		
mV		: 2245
Timing device travel	mm	: 9.3...11.7
>	mm	: (8.0...13.0)
2nd speed	1/min	: 750
Checkbk. volt.		
mV		: 3350
Timing device travel	mm	:
>	mm	: (9.9...11.7)
3rd speed	1/min	: 1000
Checkbk. volt.		
mV		: 1475
Timing device travel	mm	: max. 0.3
>	mm	: (max. 0.5)
Solenoid valve Start of injection,	volts	: 12
4.th speed	1/min	: 1400
Checkbk. volt.		
mV		: 1475
Timing device travel	mm	:
>	mm	: (max. 1.0)
Start of injection,	volts	: 12
5.th speed	1/min	: 2000
Checkbk. volt.		
mV		: 3890
Timing device travel	mm	: 11.6...12.8
>	mm	: (11.4...13.0)
6.th speed	1/min	: 150
Checkbk. volt.		
mV		: 2230
Timing device travel	mm	: 2.0...7.0
>	mm	: (min. 1.5)

Overflow at overflow valve:

1st temperature-conditioning revolution	1/min	: 100
Checkbk. volt.		
mV		: 2500
Output temperature °C		: 51
Speed	1/min	: 2000
Checkbk. volt.		
mV		: 3890
Measuring temperature °C		: 53
Overflow		: 40...60
>	cm³/10	: (35...65)

C10

Fuel delivery variations:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt
mV : 2500
Output
temperature °C : 51
Speed 1/min : 2000
Checkbk. volt
mV : 3890
Measuring
temperature °C : 53
Fuel delivery cm³/ : 47.7...50.3
> 1000s : (46.5...51.5)
Dispersion cm³/ : 4.0
> 1000s. : (5.0)

2nd temperature-conditioning
revolution 1/min : 2000
Checkbk. volt
mV : 2500
Output
temperature °C : 60
Speed 1/min : 1000
Checkbk. volt
mV : 2860
Measuring
temperature °C : 56
Fuel delivery cm³/ : 41.6...44.2
> 1000s : (40.4...45.4)
Dispersion cm³/ : 3.0
> 1000s : (4.0)

3rd temperature-conditioning
revolution 1/min : 2000
Checkbk. volt
mV : 2500
Output
temperature °C : 61
Speed 1/min : 750
Checkbk. volt
mV : 2480
Measuring
temperature °C : 57
Fuel delivery cm³/ :
> 1000s : (37.0...41.0)
Dispersion cm³/ :
> 1000s : (5.0)
4th temperature-conditioning
revolution 1/min : 2000
Checkbk. volt
mV : 2500
Output
temperature °C : 61
Speed 1/min : 500
Checkbk. volt
mV : 2245
Measuring
temperature °C : 57
Fuel delivery cm³/ : 36.7...39.3
> 1000s : (35.7...40.3)
Dispersion cm³/ : 4.0
> 1000s : (5.0)

Idle delivery:

1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 500
Checkbk. volt mV : 1600
Measuring
temperature °C : 57
Fuel delivery cm³/ : 10.2...15.2
> 1000s : (9.2...16.2)
Solenoid valve
Start of
injection, volts : 12
Dispersion cm³/ : 4.0
> 1000s : (5.0)

Starting fuel delivery:
1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 65
Speed 1/min : 100
Checkbk. volt mV : 2230
Measuring
temperature °C : 61
Fuel delivery cm³/ :
> 1000s : 31.0
Solenoid valve
Start of
injection, volts : 12

Stop test:

Speed 1/min : 750
Checkbk. volt mV : 2480
ELAB volts : 0
Fuel delivery cm³/ :
max. 1000s : 8.0

Shutoff solenoid:

Cut-in voltage
min.> volts : 10.0
Rated voltage,
volts : 12.0

Notes:

Take note of test instructions "Distributor pump for direct injectors"!

Dimensions for mounting and setting:

Description		
K	mm	:
KF	mm	: 5,8...6,2
SVS max.	mm	:
FH	mm	:
TS		: 1 467 010 376

C11

C11

BOSCH INJECTION PUMP TEST SPECIFICATIONS

Obsereve notes in remark colum

Test sheet : Audi
Date of manufacture :
Edition :13.04.1992
Replaces :
Test oil : ISO 4113

Injection pump : VE5/11E2400L323

Type No. : 0 460 415 999
Customer Ident.No. :

Customer-specific details
Customer :Audi

Engine : 180-02-TDI-C3

Output kW :
Speed 1/min :

TEST BENCH PREREQUISITES

Inlet pressure, bar : 0,30...0,40

Calibrating nozzle-
holder assembly > : 1 688 901 114

Opening
pressure > bar : 207...210

Test pressure line : 1 680 750 085

Outer diameter : 6.00
x wall thickness > : 2.20
x length > mm : 350

Overflow valve : 2 467 413 006

Test line : KDEP 1865/3
(fuel-delivery actuator)

Test line : KDEP 1865/6
(solenoid valve
start of injection)

TEST PRECONDITIONS

Test oil
return temp. > °C
with thermometer : 55

Test oil supply
temperature > °C : 42...47

Hold-up
revolutions >1/min : 1200
Feedback
voltage mV : 2500

ELECTRICAL TEST

Actuator
Connections 4 and 7
Test temperature:
15°...30°C, ohms : 0,4...1,0
50°...70°C, ohms : 0,45...1,1

Connections 4 and.
ground, Mohms min. : 1,0
Connections 7 and
ground, Mohms min. : 1,0
Connections 2 and 7
Mohms min. : 1,0
Connections 4 and 6
Mohms min. : 1,0

Control-collar travel sensor
Test temperature :
15°...70°C
Connections 2 and 3
kohms : 1,0...3,0
Connections 1 and 3
kohms : 0,5...2,0

Connections 1 and.
ground, Mohms min. : 1,0
Connections 2 and
ground, Mohms min. : 1,0
Connections 3 and
ground, Mohms min. : 1,0

Temperature sensor, fuel
Connentions 5 and 6
Test temperature:
15°...30°C, kohms : 1,2...4,0
50°...70°C, kohms : 0,3...1,2

Connections 5 and
ground, Mohms min. : 1,0
Connections 6 and
ground Mohms min. : 1,0

Solenoid valve, start of injection
Connections 1 and 2
Test temperature :
15°...30°C, ohms : 14,3...17,3
50°...70°C, ohms : 15,5...21,0

Starting stop mV : 4120...4650

Shutoff stop mV : 650...850

C12

C12

Setting values of injection pump
Check values in brackets

Supply pump pressure:
Speed 1/min : 1000
Checkbk. volt.
mV : 3300
Setting value, bar : 7,1...8,1

Timing device travel:
Speed 1/min : 1000
Checkbk. volt
mV : 3300
Setting value, mm : 10,4...10,6

Full-load delivery :
1st temperature-conditioning
revolution 1/min : 2125
Checkbk. volt
mV : 2500
Output
temperature °C : 61
Speed 1/min : 750
Checkbk. volt
mV : 2740
Measuring
temperature °C : 57
Fuel delivery cm³/
> 1000s : 38,3...38,7
Dispersion cm³/ : 2,5
> 1000s :

Test specifications of injection pump
Check values in brackets

Supply pump pressure variations:

1st speed 1/min : 2125
Checkbk. volt
mV : 3900
Supply pump
pressure > bar : 8,9...9,9
> bar :

Timing device variations:

1st speed 1/min : 500
Checkbk. volt. mV : 2500
Timing device
travel mm : 7,8...10,2
> mm : (6,7...11,3)

2nd speed 1/min : 1000
Checkbk. volt. mV : 3300
Timing device
travel mm :
> mm : (9,6...11,4)

3rd speed 1/min : 1000
Checkbk. volt. mV : 1800
Timing device
travel mm : max. 0,3
> mm : (max. 1,0)
Solenoid valve
Start of
injection, volts : 12

4.th speed 1/min : 2125
Checkbk. volt. mV : 3900
Timing device
travel mm : 10,2...11,8
> mm : (9,5...12,5)

Overflow at overflow valve:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt. mV : 2500
Output
temperature °C : 51
Speed 1/min : 2125
Checkbk. volt. mV : 3900
Measuring
temperature °C : 53
Overflow : 40...60
> cm³/10 : (35...65)

C13

Fuel delivery variations:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt mV : 2500
Output
temperature °C : 51
Speed 1/min : 2125
Checkbk. volt mV : 3900
Measuring
temperature °C : 53
Fuel delivery cm³/ : 46,4...49,0
> 1000s : (45,2...50,2)
Dispersion cm³/ : 3,0
> 1000s. :

2nd temperature-conditioning
revolution 1/min : 2125
Checkbk. volt mV : 2500
Output
temperature °C : 60
Speed 1/min : 1000
Checkbk. volt mV : 3300
Measuring
temperature °C : 56
Fuel delivery cm³/ : 47,5...50,1
> 1000s : (46,3...51,3)
Dispersion cm³/ : 2,5
> 1000s : (4,0)

3rd temperature-conditioning
revolution 1/min : 2125
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 750
Checkbk. volt mV : 2740
Measuring
temperature °C : 57
Fuel delivery cm³/ :
> 1000s : (36,5...40,5)

4th temperature-conditioning
revolution 1/min : 2125
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 500
Checkbk. volt mV : 2500
Measuring
temperature °C : 57
Fuel delivery cm³/ : 35,5...38,1
> 1000s : (34,5...39,1)
Dispersion cm³/ : 3,0
> 1000s :

Idle delivery:

1st temperature-conditioning
revolution 1/min : 2125
Checkbk. volt mV : 2500
Output
temperature °C : 65
Speed 1/min : 400
Checkbk. volt mV : 2000
Measuring
temperature °C : 61
Fuel delivery cm³/ : 6,5...11,5
> 1000s : (4,5...13,5)
Solenoid valve
Start of
injection, volts : 12
Dispersion cm³/ : 5,0
> 1000s : (6,0)

Starting fuel delivery:
1st temperature-conditioning
revolution 1/min : 2125
Checkbk. volt mV : 2500
Output
temperature °C : 65
Speed 1/min : 100
Checkbk. volt mV : 3500
Measuring
temperature °C : 61
Fuel delivery cm³/ :
> 1000s : 73,0
Solenoid valve
Start of
injection, volts : 12

Stop test:
Speed 1/min : 1100
Checkbk. volt mV : 4125
ELAB volts : 0
Fuel delivery cm³/ :
max. 1000s : 3,0
Start of
injection, volts : 12

Shutoff solenoid:

Cut-in voltage
min.> volts : 10,0
Rated voltage,
volts : 12,0

Notes:

Take note of test instructions "Distributor pump for direct injectors"!

Dimensions for mounting and setting:
Description
K mm :
KF mm : 6,5...6,9
SVS max. mm :
FH mm :
TS : 1 467 010 494

C14

C14

BOSCH TEST SPECS. IP ASSEMBLY

TEST SHEET: MAN
Edition: 06.93 (2) EN

Pump: PES 5 P 120 A 720/3 LS 7250
Regulator: RE 30
IP-ASSEMBLY 0 402 795 800

Type number: 0 412 725 810
Type number: 0 421 890 012
CUSTOMER IDENT. NO.:

Customer-specific details
Customer: MAN
Engine: D 2865 LF 10
Output kW:
at 1/min:

		Min	Max
Test PREREQUISITES			
Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 025	
Inlet pressure	bar	1.5	1.6
Overflow	l/h	-	-
Calibrating nozzle-holder assembly		1 688 901 105	
Opening pressure	bar	207	210
Perforated plate diameter	mm	0.8	
Test pressure line		1 680 750 015	
Dimensions:			
Outer diameter.	mm	6.0	
x wall thickness	mm	1.5	
x length	mm	600	
TEST SPECIFICATIONS			
Section A -			
Setting values of injection pump			
- Check values denoted by "P"			
- No basic setting. Equal delivery setting under Section C.			
PORT CLOSING 1)			
PC setting cyl.		5	
Test pressure	bar	25	27
Prestroke (from BDC)	mm	4.80	4.90
P Prestroke (from BDC)	mm	4.75	4.95
Control-rod travel	mm	15.0	16.0
Cam sequence		1 - 3 - 5 - 4 - 2	
PC difference	°CS	0-72-144-216-288	
tolerance +/-	°CS		0.50
P tolerance +/-	°CS		0.75

		Min	Max
PC mark Cyl.-No.		- 2)	
Pulse wheel position (PC cam)	°CS	0 3)	
Tolerance +/-	°CS		0.20
P Tolerance +/-	°CS		0.75
Section B -			
Actuator test			
- Check values denoted by "P"			
- Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5V			
CONTROL-ROD PICKUP SETTING			
Test speed	1/min	0	
Setting value			
U/actual	V	3.100	
Control-rod travel	mm	12.95	13.05
P Control-rod travel	mm	12.90	13.10
Check value			
U/actual	V	1.70	
Control-rod travel	mm	5.90	6.40
P Control-rod travel	mm	5.85	6.45
Stop position			
U/actual	V	mind.	4)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1
SPEED SENSOR SIGNALS			
- Test with control rod in stop position			
Speed	1/min	60	
pos.amplitude	V	0.8	2.0
P pos.amplitude	V	0.6	3.0
Speed	1/min	600	
Difference Amplitude to Amplitude	V	max. 1.4	

Continued on next page

	Min	Max

Section C -

Injection pump with actuator

- Check values denoted by "P"

FUEL DELIVERY TEST AND SETTING

Test point V1

	Speed	1/min	1000	
	U/actual	V	3.120	
	Fuel delivery	cm3/1000str	263.0	265.0
P	Fuel delivery	cm3/1000str	260.0	268.0
	Dispersion	cm3/1000str		5.0
P	Dispersion	cm3/1000str		9.0

Test point L1

	Speed	1/min	325	
	U/actual	V	1.410	1.530
	Fuel delivery	cm3/1000str	27.0	33.0
	Dispersion	cm3/1000str		8.0
P	Dispersion	cm3/1000str		12.0

REMARKS

MAN-NR.: 51.11103-7233

Dimension "Y" (Adjustment flange)	15.6		16.1

1) = Note additional test "Start-of-delivery difference":

Between	CRT mm	6.40	6.60
and	CRT mm	15.0	16.0
Difference	°CS	1.75	3.25

2) = No start-of-delivery mark.

3) = Setting of pulse-wheel position at start of delivery of cylinder No. 5.

4) = U/actual value min: U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

BOSCH TEST SPECS. IP ASSEMBLY

Pump : PES 6 P 120 A 720 RS 8501
Regulator : RE 30
IP-ASSEMBLY: 0 402 996 301

TEST SHEET : MAC
Edition : 11.93 (3) EN
Type number : 0 412 926 201
Type number : 0 421 890 015
CUSTOMER IDENT. NO.:

Customer-specific details
Customer: MACK
Engine: EM 7 - 350
Output kW: - -
at 1/min:

		Min	Max
Test PREREQUISITES			
Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 084	
Inlet pressure	bar	2.4	2.6
Overflow 1)	l/h	- -	- -
Calibrating nozzle-holder assembly		1 688 901 103	
Opening pressure	bar	207	210
Perforated plate diameter	mm	0.7	
Test pressure line		1 680 750 008	
Dimensions:			
Outer diameter	mm	6.0	
x wall thickness	mm	2.0	
x length	mm	600	
TEST SPECIFICATIONS			
Section A -			
Setting values of injection pump			
- Check values denoted by "P"			
- No basic setting. Equal delivery setting under Section C.			
PORT CLOSING			
PC setting cyl.		6	
Test pressure	bar	22	24
Prestroke (from BDC)	mm	4.55	4.65
P Prestroke (from BDC)	mm	4.50	4.70
Control-rod travel	mm	11.8	12.2
Cam sequence 1 - 5 - 3 - 6 - 2 - 4			
PC difference	°CS	60 each	
tolerance +/-	°CS		0.30
P tolerance +/-	°CS		0.75

		Min	Max
PC mark	Cyl.-No.	- 3)	
Pulse wheel position (PC cam)	°CS	0 4)	
Tolerance +/-	°CS		0.20
P Tolerance +/-	°CS		0.75
Section B -			
Actuator test			
- Check values denoted by "P"			
- Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5V			
CONTROL-ROD PICKUP SETTING			
Test speed	1/min	0	
Setting value			
U/actual	V	3.100	
Control-rod travel	mm	12.95	13.05
P Control-rod travel	mm	12.90	13.10
Check value			
U/actual	V	1.700	
Control-rod travel	mm	5.90	6.40
P Control-rod travel	mm	5.85	6.45
Stop position			
U/actual	V	mind. 5)	
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1
SPEED SENSOR SIGNALS			
- Test with control rod in stop position			
Speed	1/min	60	
pos.amplitude	V	0.8	2.0
P pos.amplitude	V	0.6	3.0
Speed	1/min	600	
Difference Amplitude to Amplitude	V	max. 1.4	

Continued on next page

			Min	Max
Section C -				
Injection pump with actuator				
- Check values denoted by "P"				
FUEL DELIVERY TEST AND SETTING				
Test point V1				
Speed	1/min		900	
U/actual	V		3.050	
Fuel delivery	cm3/1000str		309.0	311.0
P Fuel delivery	cm3/1000str		305.0	315.0
Dispersion	cm3/1000str			8.0
P Dispersion	cm3/1000str			14,0
Speed	1/min		325	
U/actual	V		1.250	1.370
Fuel delivery	cm3/1000str		30.0	36.0
Dispersion	cm3/1000str			8.0
P Dispersion	cm3/1000str			12.0

REMARKS

MACK-No.: 313 GC 5205-P1

Dimension "Y" (Adjustment flange)	15.6	15.9

1) = Setting of overflow at full load (refer to measurement point V1).

3) = No start-of-delivery mark.

4) = Setting of pulse-wheel position at start of delivery of cylinder No. 1.

5) = U/actual value min: U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

BOSCH INJECTION PUMP TEST SPECIFICATIONS

Obsereve notes in remark colum

Test sheet	: BMW
Date of manufacture	:
Edition	: 19.10.1992
Replaces	:
Test oil	: ISO 4113
Injection pump	: VE6/10E2400R300-1
Type No.	: 0 460 406 995
Customer Ident.No.	:

Customer-specific details

Customer	: BMW
Engine	: M51
Output kW	:
Speed 1/min	:

TEST BENCH PREREQUISITES

Inlet pressure, bar	: 0.30...0.40
Calibrating nozzle-holder assembly >	: 1 688 901 022
Opening pressure > bar	: 130...133
Test pressure line	: 1 680 750 073
Outer diameter	: 6.00
x wall thickness >	: 2.00
x length > mm	: 450
Test line (fuel-delivery actuator)	: 0 986 612 430 (KDEP 1865/1)
Test line (solenoid valve start of injection)	: 0 986 612 435 (KDEP 1865/6)

ELECTRICAL TEST

Actuator
Connections 4 and 7
Test temperature:

15°...30°C, ohms	: 0.4...1.0
50°...70°C, ohms	: 0.45...1.1
Connections 4 and. ground, Mohms min.	: 1.0
Connections 7 and ground, Mohms min.	: 1.0
Connections 2 and 7 Mohms min.	: 1.0
Connections 4 and 6 Mohms min.	: 1.0

Control-collar travel sensor

Test temperature 15°...70°C	:
Connections 2 and 3 kohms	: 1.0...3.0
Connections 1 and 3 kohms	: 0.5...2.0
Connections 1 and. ground, Mohms min.	: 1.0
Connections 2 and ground, Mohms min.	: 1.0
Connections 3 and ground, Mohms min.	: 1.0

Temperature sensor, fuel
Connentions 5 and 6
Test temperature:

15°...30°C, kohms	: 1.2...4.0
50°...70°C, kohms	: 0.3...1.2
Connections 5 and ground, Mohms min.	: 1.0
Connections 6 and ground Mohms min.	: 1.0

Solenoid valve, start of injection
Connections 1 and 2
Test temperature :

15°...30°C, ohms	: 14.3...17.3
50°...70°C, ohms	: 15.5...21.0
Starting stop mV	: 4120...4650
Shutoff stop mV	: 650...850

C19

Setting values of injection pump
Check values in brackets

Supply pump pressure:
Speed 1/min : 1500
Checkbk. volt.
mV : 3000
Setting value, bar : 7.2...7.8

Timing device travel:
Speed 1/min : 1500
Checkbk. volt
mV : 3000
Setting value, mm : 8.4...8.8

Full-load delivery :
1st temperature-conditioning
revolution 1/min : 1500
Checkbk. volt
mV : 3000
Fuel delivery cm^3/
> 1000s : 44.5...44.9
Dispersion cm^3/ : 2.0
> 1000s :

Test specifications of injection pump
Check values in brackets

Supply pump pressure variations:

1st speed 1/min : 2400
Checkbk. volt
mV : 3000
Supply pump
pressure > bar : 8.5...9.5
> bar :

2st speed 1/min : 350
Checkbk. volt
mV : 3850
Supply pump
pressure > bar : 5.4...6.3
> bar :

Timing device variations:

1st speed 1/min : 350
Checkbk. volt. mV : 3850
Timing device
travel mm : 4.8...6.2
> mm : (4.5...6.5)

2nd speed 1/min : 1500
Checkbk. volt. mV : 3000
Timing device
travel mm :
> mm : (7.9...9.3)

3rd speed 1/min : 1500
Checkbk. volt. mV : 3000
Timing device
travel mm : 0.0...0.2
> mm :
Solenoid valve
Start of
injection, volts : 12

4.th speed 1/min : 2300
Checkbk. volt. mV : 3000
Timing device
travel mm : 9.5...10.1
> mm : (9.3...10.3)
5.th speed 1/min : 150
Checkbk. volt. mV : 3850
Timing device
travel mm : 1.3...4.7
> mm : (1.0...5.0)

Overflow at overflow valve:

Speed 1/min : 2400
Checkbk. volt. mV : 3000
Overflow : 69...180
> cm^3/10 :

Fuel delivery variations:

1. Speed	1/min	: 2400
Checkbk. volt	mV	: 3000
Fuel delivery	cm³/	: 45.0...47.0
>	1000s	: (43.5...48.5)
Dispersion	cm³/	: 2.5
>	1000s.	: (2.5)
2. Speed	1/min	: 1500
Checkbk. volt	mV	: 3000
Fuel delivery	cm³/	:
>	1000s	: (42.9...46.5)
Dispersion	cm³/	:
>	1000s	: (2.0)
3. Speed	1/min	: 1000
Checkbk. volt	mV	: 3100
Fuel delivery	cm³/	: 46.0...48.0
>	1000s	: (44.5...49.5)
Dispersion	cm³/	: 2.0
>	1000s	: (2.0)
4. Speed	1/min	: 1000
Checkbk. volt	mV	: 2350
Fuel delivery	cm³/	: 13.6...14.8
>	1000s	: (11.9...16.5)
Dispersion	cm³/	: 2.0
>	1000s	: (2.0)
4. Speed	1/min	: 5000
Checkbk. volt	mV	: 3000
Fuel delivery	cm³/	: 30.9...32.9
>	1000s	: (29.4...34.4)
Dispersion	cm³/	: 2.0
>	1000s	: (2.0)

Idle delivery:

Speed	1/min	: 350
Checkbk. volt	mV	: 2600
Fuel delivery	cm³/	: 7.4...9.4
>	1000s	: (5.9...10.9)
Solenoid valve		
Start of		
injection, volts		: 12
Dispersion	cm³/	: 4.0
>	1000s	: (2.0)

Starting fuel delivery:

Speed	1/min	: 100
Checkbk. volt	mV	: 3680
Fuel delivery	cm³/	:
>	1000s	: 33.0
Solenoid valve		
Start of		
injection, volts		: 12

Stop test:

Speed	1/min	: 2400
Checkbk. volt	mV	: 3000
ELAB	volts	: 0
Fuel delivery	cm³/	:
max.	1000s	: 3.0

Shutoff solenoid:

Cut-in voltage	
min.> volts	: 10.0
Rated voltage,	
volts	: 12.0

Notes:

Take note of test instructions "Distributor pump for direct injectors"!

Dimensions for mounting and setting:

Description		
K	mm	:
KF	mm	:
SVS max.	mm	:
FH	mm	:

BOSCH INJECTION PUMP TEST SPECIFICATIONS

Obsereve notes in remark colum

Test sheet	: Audi
Date of manufacture	:
Edition	: 01.06.1993
Replaces	:
Test oil	: ISO 4113
Injection pump	: VE5/11E2300L460
Type No.	: 0 460 415 997
Customer Ident.No.	:

Customer-specific details

Customer	:Audi
Engine	: 180-02-TDI-C4
Output kW	:
Speed 1/min	:

TEST BENCH PREREQUISITES

Inlet pressure, bar	: 0,30...0,40
Calibrating nozzle-holder assembly >	: 1 688 901 114
Opening pressure > bar	: 207...210
Test pressure line	: 1 680 750 085
Outer diameter	: 6,00
x wall thickness >	: 2,20
x length > mm	: 350
Overflow valve	: 2 467 413 009
Test line	: 0 986 612 440
(fuel-delivery actuator)	: (KDEP 1865/11)
Test line	: 0 986 612 435
(solenoid valve start of injection)	: (KDEP 1865/6)

TEST PRECONDITIONS

Test oil return temp. > °C with thermometer	: 55
Test oil supply temperature > °C	: 42...47
Hold-up revolutions >1/min	: 1200
Feedback voltage mV	: 2500

ELECTRICAL TEST

Actuator
Connections 4 and 7
Test temperature:

15°...30°C, ohms	: 0,4...1,0
50°...70°C, ohms	: 0,45...1,1
Connections 4 and. ground, Mohms min.	: 1,0
Connections 7 and ground, Mohms min.	: 1,0
Connections 2 and 7 Mohms min.	: 1,0
Connections 4 and 6 Mohms min.	: 1,0

High-pressure compressor sensor
Sensor coils

Connections 1 and 3 Ohms	: 4,9...6,5
Connections 2 and 3 Ohms	: 4,9...6,5
Connections 1 and 2 Ohms	: 9,8...13,0
Connections 1 and. ground, Mohms min.	: 1,0
Connections 2 and ground, Mohms min.	: 1,0
Connections 3 and ground, Mohms min.	: 1,0

Temperature sensor, fuel
Connentions 5 and 6
Test temperature:

15°...30°C, kohms	: 1,2...4,0
50°...70°C, kohms	: 0,3...1,2
Connections 5 and ground, Mohms min.	: 1,0
Connections 6 and ground Mohms min.	: 1,0

Solenoid valve, start of injection
Connections 1 and 2
Test temperature :

15°...30°C, ohms	: 14,3...17,3
50°...70°C, ohms	: 15,5...21,0
Starting stop mV	: 4120...4650
Shutoff stop mV	: 650...850

C22

22

Setting values of injection pump
Check values in brackets

Supply pump pressure:
Speed 1/min : 750
Checkbk. volt.
mV : 3900
Setting value, bar : 6,0...7,0

Timing device travel:
Speed 1/min : 750
Checkbk. volt
mV : 3900
Setting value, mm : 9,30...9,50

Full-load delivery :
1st temperature-conditioning
revolution 1/min : 2125
Checkbk. volt
mV : 2500
Output
temperature °C : 61
Speed 1/min : 750
Checkbk. volt
mV : 2460
Measuring
temperature °C : 57
Fuel delivery cm^3/
> 1000s : 39,6...40,0
Dispersion cm^3/ : 2,5
> 1000s :

Test specifications of injection pump
Check values in brackets

Supply pump pressure variations:

1st speed 1/min : 2125
Checkbk. volt
mV : 3900
Supply pump
pressure > bar : 7,9...8,9
> bar :

Timing device variations:

1st speed 1/min : 500
Checkbk. volt. mV : 3900
Timing device
travel mm : 7,5...9,9
> mm : (7,2...10,2)

2nd speed 1/min : 750
Checkbk. volt. mV : 3900
Timing device
travel mm :
> mm : (7,5...11,3)

3rd speed 1/min : 1200
Checkbk. volt. mV : 1800
Timing device
travel mm : max. 0,3
> mm : (max. 1,0)
Solenoid valve
Start of
injection, volts : 12

4.th speed 1/min : 2125
Checkbk. volt. mV : 3900
Timing device
travel mm : 11,6...12,6
> mm : (11,5...12,7)

Overflow at overflow valve:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt. mV : 2500
Output
temperature °C : 51
Speed 1/min : 2125
Checkbk. volt. mV : 3900
Measuring
temperature °C : 53
Overflow : 110...165
> cm^3/10 : (97...180)

C23

Fuel delivery variations:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt mV : 2500
Output
temperature °C : 51
Speed 1/min : 2125
Checkbk. volt mV : 3900
Meßtemperatur °C : 53
Fuel delivery cm³/ : 54,3...56,9
> 1000s : (53,6...57,6)
Dispersion cm³/ : 3,0
> 1000s. :

2nd temperature-conditioning
revolution 1/min : 2125
Checkbk. volt mV : 2500
Output
temperature °C : 60
Speed 1/min : 1000
Checkbk. volt mV : 3210
Measuring
temperature °C : 56
Fuel delivery cm³/ : 55,7...58,3
> 1000s : (55,0...59,0)
Dispersion cm³/ : 2,0
> 1000s : (2,5)

3rd temperature-conditioning
revolution 1/min : 2125
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 750
Checkbk. volt mV : 2460
Measuring
temperature °C : 57
Fuel delivery cm³/ :
> 1000s : (38,5...41,1)
Dispersion cm³/ :
> 1000s :

4th temperature-conditioning
revolution 1/min : 2125
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 500
Checkbk. volt mV : 2320
Measuring
temperature °C : 57
Fuel delivery cm³/ : 40,8...43,4
> 1000s : (40,1...44,1)
Dispersion cm³/ : 3,0
> 1000s :

Idle delivery:
1st temperature-conditioning
revolution 1/min : 2125
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 500
Checkbk. volt mV : 1520
Meßtemperatur °C : 57
Fuel delivery cm³/ : 8,1...12,1
> 1000s : (7,1...13,1)
Solenoid valve
Start of
injection, volts : 12
Dispersion cm³/ : 3,0
> 1000s : (4,0)

Starting fuel delivery:
1st temperature-conditioning
revolution 1/min : 2125
Checkbk. volt mV : 2500
Output
temperature °C : 65
Speed 1/min : 100
Checkbk. volt mV : 2960
Measuring
temperature °C : 61
Fuel delivery cm³/ :
> 1000s : 72,3
Solenoid valve
Start of
injection, volts : 12

Stop test:
Speed 1/min : 1100
Checkbk. volt mV : 4125
ELAB volts : 0
Fuel delivery cm³/ :
max. 1000s : 3,0
Start of
injection, volts : 12

Shutoff solenoid:
Cut-in voltage
min.> volts : 10,0
Rated voltage,
volts : 12,0

Notes:
High-pressure compressor sensor
Testing only possible with ballast
EPS 910

Take note of test instructions
"Distributor pump for direct
injectors"!

Dimensions for mounting and setting:

Description		
K	mm	: 2.7...2.9
KF	mm	:
SVS max.	mm	:
FH	mm	:

BOSCH INJECTION PUMP TEST SPECIFICATIONS

Obsereve notes in remark colum

Test sheet	:	Alfa
Date of manufacture	:	
Edition	:	19.10.1992
Replaces	:	
Test oil	:	ISO 4113
Injection pump	:	VE4/10E2100L450
Type No.	:	0 460 404 997
Customer Ident.No.	:	

Customer-specific details

Customer	:	Motori VM
Engine	:	425 CHIEA
Output kW	:	
Speed 1/min	:	2200

TEST BENCH PREREQUISITES

Inlet pressure, bar	:	0.30...0.40
Calibrating nozzle-holder assembly >	:	1 688 901 022
Opening pressure > bar	:	130...133
Test pressure line	:	1 680 750 073
Outer diameter	:	6.00
x wall thickness >	:	2.00
x length > mm	:	450
Overflow valve	:	2 467 413 009
Test line	:	0 986 612 434
(fuel-delivery actuator)	:	(KDEP 1865/5)
Test line	:	0 986 612 435
(solenoid valve start of injection)	:	(KDEP 1865/6)

TEST PRECONDITIONS

Test oil return temp. > °C with thermometer	:	45
Test oil supply temperature > °C	:	35...40
Hold-up revolutions >1/min	:	1100
Feedback voltage mV	:	2500

ELECTRICAL TEST

Actuator
Connections 4 and 7
Test temperature:

15°...30°C, ohms	:	0.4...1.0
50°...70°C, ohms	:	0.45...1.1
Connections 4 and. ground, Mohms min.	:	1.0
Connections 7 and ground, Mohms min.	:	1.0
Connections 2 and 7 Mohms min.	:	1.0
Connections 4 and 6 Mohms min.	:	1.0

Control-collar travel sensor

Test temperature	:	15°...70°C
Connections 2 and 3 kohms	:	1.0...3.0
Connections 1 and 3 kohms	:	0.5...2.0
Connections 1 and. ground, Mohms min.	:	1.0
Connections 2 and ground, Mohms min.	:	1.0
Connections 3 and ground, Mohms min.	:	1.0

Temperature sensor, fuel
Connentions 5 and 6
Test temperature:

15°...30°C, kohms	:	1.2...4.0
50°...70°C, kohms	:	0.3...1.2
Connections 5 and ground, Mohms min.	:	1.0
Connections 6 and ground Mohms min.	:	1.0

Solenoid valve, start of injection
Connections 1 and 2
Test temperature

15°...30°C, ohms	:	14.3...17.3
50°...70°C, ohms	:	15.5...21.0
Starting stop mV	:	4120...4650
Shutoff stop mV	:	650...850

D1

D1

Setting values of injection pump
Check values in brackets

Supply pump pressure:
Speed 1/min : 500
Checkbk. volt.
mV : 2700
Setting value, bar : 6.1...6.7

Timing device travel:
Speed 1/min : 500
Checkbk. volt
mV : 2700
Setting value, mm : 8.10...8.50

Full-load delivery :
1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt
mV : 2500
Output
temperature °C : 42
Speed 1/min : 1250
Checkbk. volt
mV : 2000
Measuring
temperature °C : 44
Fuel delivery cm³/
> 1000s : 30.0...30.4
Dispersion cm³/ : 2.0
> 1000s :

Test specifications of injection pump
Check values in brackets

Supply pump pressure variations:

1st speed 1/min : 2100
Checkbk. volt
mV : 2700
Supply pump
pressure > bar : 8.2...9.2
> bar :

2st speed 1/min : 150
Checkbk. volt
mV : 2900
Supply pump
pressure > bar : 3.5...5.5
> bar :

Timing device variations:

1st speed 1/min : 500
Checkbk. volt. mV : 2700
Timing device
travel mm :
> mm : (7.6...9.0)

2nd speed 1/min : 1000
Checkbk. volt. mV : 2700
Timing device
travel mm : 9.1...9.7
> mm : (8.7...10.1)

3rd speed 1/min : 1000
Checkbk. volt. mV : 1550
Timing device
travel mm : max. 0.5
> mm :
Solenoid valve
Start of
injection, volts : 12

4th speed 1/min : 2100
Checkbk. volt. mV : 2700
Timing device
travel mm : 9.5...10.1
> mm : (9.4...10.2)

5th speed 1/min : 2100
Checkbk. volt. mV : 1450
Timing device
travel mm : max. 1.0
> mm :
Solenoid valve
Start of
injection, volts : 12

6th speed 1/min : 150
Checkbk. volt. mV : 2900
Timing device
travel mm : 3.0...6.0
> mm : (2.0...7.0)
Solenoid valve

Overflow at overflow valve:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt. mV : 2500
Output
temperature °C : 41
Speed 1/min : 2100
Checkbk. volt. mV : 2700
Measuring
temperature °C : 43
Overflow : 55...165
> cm³/10s :

D2

D2

Fuel delivery variations:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt mV : 2500
Output
temperature °C : 41
Speed 1/min : 2100
Checkbk. volt mV : 2700
Meßtemperatur °C : 43
Fuel delivery cm³/ : 64.0...67.0
> 1000s : (63.0...68.0)
Dispersion cm³/ : 2.0
> 1000s. : (2.5)

2nd temperature-conditioning
revolution 1/min : 100
Checkbk. volt mV : 2500
Output
temperature °C : 42
Speed 1/min : 1500
Checkbk. volt mV : 2700
Measuring
temperature °C : 44
Fuel delivery cm³/ : 67.6...70.0
> 1000s : (66.3...71.3)
Dispersion cm³/ : 2.0
> 1000s : (2.5)

3rd temperature-conditioning
revolution 1/min : 100
Checkbk. volt mV : 2500
Output
temperature °C : 42
Speed 1/min : 1250
Checkbk. volt mV : 2000
Measuring
temperature °C : 44
Fuel delivery cm³/ :
> 1000s : (28.2...32.2)
Dispersion cm³/ :
> 1000s : (2.5)

4th temperature-conditioning
revolution 1/min : 2100/100
Checkbk. volt mV : 2500
Output
temperature °C : 45
Speed 1/min : 1000
Checkbk. volt mV : 2700
Measuring
temperature °C : 45
Fuel delivery cm³/ : 68.4...70.8
> 1000s : (67.1...72.1)
Dispersion cm³/ : 2.0
> 1000s : (2.5)

5th temperature-conditioning
revolution 1/min : 2100
Checkbk. volt mV : 2500
Output
temperature °C : 48
Speed 1/min : 600
Checkbk. volt mV : 2300
Measuring
temperature °C : 46
Fuel delivery cm³/ : 44.8...47.8
> 1000s : (43.8...48.8)
Dispersion cm³/ : 2.0
> 1000s : (2.5)

Idle delivery:

1st temperature-conditioning
revolution 1/min : 2100
Checkbk. volt mV : 2500
Output
temperature °C : 51
Speed 1/min : 400
Checkbk. volt mV : 1830
Meßtemperatur °C : 49
Fuel delivery cm³/ :
> 1000s : (13.5...18.5)
Solenoid valve
Start of
injection, volts : 12
Dispersion cm³/ :
> 1000s : (2.5)

Starting fuel delivery:
1st temperature-conditioning
revolution 1/min : 2100
Checkbk. volt mV : 2500
Output
temperature °C : 51
Speed 1/min : 100
Checkbk. volt mV : 2900
Measuring
temperature °C : 49
Fuel delivery cm³/ :
> 1000s : 56.0
Solenoid valve
Start of
injection, volts : 12

Stop test:
Speed 1/min : 2100
Checkbk. volt mV : 2700
ELAB volts : 0
Fuel delivery cm³/ :
max. 1000s : 3.0

Shutoff solenoid:

Cut-in voltage
min.> volts : 10.0
Rated voltage,
volts : 12.0

Notes:

Take note of test instructions
"Distributor pump for direct
injectors"!

Dimensions for mounting and setting:

Description		
K	mm	:
KF	mm	:
SVS max.	mm	:
FH	mm	:

D4

BOSCH INJECTION PUMP TEST SPECIFICATIONS

Obsereve notes in remark colum

Test sheet	: VW
Date of manufacture	:
Edition	: 19.10.1992
Replaces	:
Test oil	: ISO 4113
Injection pump	: VE4/10E2250R440-1
Type No.	: 0 460 404 995
Customer Ident.No.	:

Customer-specific details

Customer	: VW
Engine	: 028.C
Output kW	:
Speed 1/min	:

TEST BENCH PREREQUISITES

Inlet pressure, bar	: 0.30...0.40
Calibrating nozzle-holder assembly >	: 1 688 901 114
Opening pressure > bar	: 207...210
Test pressure line	: 1 680 750 085
Outer diameter	: 6.00
x wall thickness >	: 2.20
x length > mm	: 350
Overflow valve	: 2 467 413 006
Test line	: 0 986 612 432
(fuel-delivery	: (KDEP 1865/3)
actuator)	
Test line	: 0 986 612 983
(solenoid valve	: (KDEP 1190)
start of injection)	

TEST PRECONDITIONS

Test oil return temp. > °C with thermometer	: 55
Test oil supply temperature > °C	: 42...47
Hold-up revolutions >1/min	: 1200
Feedback voltage mV	: 2500

ELECTRICAL TEST

Actuator
Connections 4 and 7
Test temperature:

15°...30°C, ohms	: 0.4...1.0
50°...70°C, ohms	: 0.45...1.1
Connections 4 and. ground, Mohms min.	: 1.0
Connections 7 and ground, Mohms min.	: 1.0
Connections 2 and 7 Mohms min.	: 1.0
Connections 4 and 6 Mohms min.	: 1.0

Control-collar travel sensor

Test temperature	:
15°...70°C	
Connections 2 and 3 kohms	: 1.0...3.0
Connections 1 and 3 kohms	: 0.5...2.0
Connections 1 and. ground, Mohms min.	: 1.0
Connections 2 and ground, Mohms min.	: 1.0
Connections 3 and ground, Mohms min.	: 1.0

Temperature sensor, fuel
Connentions 5 and 6
Test temperature:

15°...30°C, kohms	: 1.2...4.0
50°...70°C, kohms	: 0.3...1.2
Connections 5 and ground, Mohms min.	: 1.0
Connections 6 and ground Mohms min.	: 1.0

Solenoid valve, start of injection
Connections 1 and 2

Test temperature	:
15°...30°C, ohms	: 14.3...17.3
50°...70°C, ohms	: 15.5...21.0
Starting stop mV	: 4120...4650
Shutoff stop mV	: 650...850

D5

D5

Setting values of injection pump
Check values in brackets

Supply pump pressure:
Speed 1/min : 500
Checkbk. volt.
mV : 2245
Setting value, bar : 6.5...7.1

Timing device travel:
Speed 1/min : 750
Checkbk. volt
mV : 3350
Setting value, mm : 10.70...10.90

Full-load delivery :
1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt
mV : 2500
Output
temperature °C : 61
Speed 1/min : 750
Checkbk. volt
mV : 2480
Measuring
temperature °C : 57
Fuel delivery cm³/
> 1000s : 40.1...40.5
Dispersion cm³/ : 2.5
> 1000s :

Test specifications of injection pump
Check values in brackets

Supply pump pressure variations:

1st speed 1/min : 2000
Checkbk. volt
mV : 3890
Supply pump
pressure > bar : 9.0...9.6
> bar :

2st speed 1/min : 150
Checkbk. volt
mV : 2230
Supply pump
pressure > bar : mind.3.5

Timing device variations:

1st speed 1/min : 500
Checkbk. volt. mV : 2245
Timing device
travel mm : 9.3...11.7
> mm : (8.9...12.1)

2nd speed 1/min : 750
Checkbk. volt. mV : 3350
Timing device
travel mm :
> mm : (9.8...11.8)

3rd speed 1/min : 1400
Checkbk. volt. mV : 1475
Timing device
travel mm : max. 0.8
> mm :
Solenoid valve
Start of
injection, volts : 12

4.th speed 1/min : 2000
Checkbk. volt. mV : 3890
Timing device
travel mm : 11.6...12.8
> mm : (11.4...13.0)

5.th speed 1/min : 150
Checkbk. volt. mV : 2230
Timing device
travel mm : 2.0...7.0
> mm : (mind.1.5)

Overflow at overflow valve:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt. mV : 2500
Output
temperature °C : 51
Speed 1/min : 2000
Checkbk. volt. mV : 3890
Measuring
temperature °C : 53
Overflow : 110...165
> cm³/10s :

Fuel delivery variations:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt mV : 2500
Output
temperature °C : 51
Speed 1/min : 2000
Checkbk. volt mV : 3890
Meßtemperatur °C : 53
Fuel delivery cm³/ : 49.3...51.9
> 1000s : (48.8...52.4)
Dispersion cm³/ : 2.5
> 1000s. : (2.5)

2nd temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 60
Speed 1/min : 1000
Checkbk. volt mV : 2860
Measuring
temperature °C : 56
Fuel delivery cm³/ : 42.9...45.5
> 1000s : (42.7...45.7)
Dispersion cm³/ : 2.5
> 1000s : (2.5)

3rd temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 750
Checkbk. volt mV : 2480
Measuring
temperature °C : 57
Fuel delivery cm³/ :
> 1000s : (39.0...41.6)
Dispersion cm³/ :
> 1000s : (2.5)

4th temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 500
Checkbk. volt mV : 2245
Measuring
temperature °C : 57
Fuel delivery cm³/ : 38.3...40.9
> 1000s : (37.3...41.9)
Dispersion cm³/ : 3.0
> 1000s : (3.0)

Idle delivery:

1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 500
Checkbk. volt mV : 1600
Meßtemperatur °C : 57
Fuel delivery cm³/ : 11.8...16.8
> 1000s : (11.3...17.3)
Solenoid valve
Start of
injection, volts : 12
Dispersion cm³/ : 4.0
> 1000s : (4.0)

Starting fuel delivery:
1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 65
Speed 1/min : 100
Checkbk. volt mV : 2230
Measuring
temperature °C : 61
Fuel delivery cm³/ :
> 1000s : 31.8
Solenoid valve
Start of
injection, volts : 12

Stop test:
Speed 1/min : 750
Checkbk. volt mV : 2480
ELAB volts : 0
Fuel delivery cm³/ :
max. 1000s : 3.0

Shutoff solenoid:

Cut-in voltage
min.> volts : 10.0
Rated voltage,
volts : 12.0

Notes:

Take note of test instructions
"Distributor pump for direct
injectors"!

Dimensions for mounting and setting:

Description
K mm :
KF mm : 5.8...6.2
SVS max. mm :
FH mm :
TS : 1 467 010 376

D7

BOSCH TEST SPECS. IP ASSEMBLY

Pump : PE 6 P 120 A 320 RS 8018
Regulator : RE 30
IP-ASSEMBLY: 0 402 896 007

TEST SHEET : VOL
Edition : 06.93 (2) EN
Type number : 0 412 826 019
Type number : 0 421 890 010
CUSTOMER IDENT. NO.:

Customer-specific details
Customer: VOLVO (BUS 8885, 8889)
Engine: THD 103KF,KB,TD 103KB,KF
Output kW: 180/210
at 1/min:

		Min	Max
Test PREREQUISITES			
Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 078	
Inlet pressure	bar	2.5	2.6
Overflow	l/h	- -	- -
Calibrating nozzle-holder assembly		1 688 901 103	
Opening pressure	bar	207	210
Perforated plate diameter	mm	0.7	
Test pressure line		1 680 750 008	
Dimensions:			
Outer diameter.	mm	6.0	
x wall thickness	mm	2.0	
x length	mm	600	
TEST SPECIFICATIONS			
Section A -			
Setting values of injection pump			
- Check values denoted by "P"			
- No basic setting. Equal delivery setting under Section C.			
PORT CLOSING			
PC setting cyl.		1	
Test pressure	bar	25	27
Prestroke (from BDC)	mm	2.95	3.05
P Prestroke (from BDC)	mm	2.90	3.10
Control-rod travel	mm	10.0	11.0
Cam sequence		1 - 5 - 3 - 6 - 2 - 4	
PC difference	°CS	60 each	
tolerance +/-	°CS		0.50
P tolerance +/-	°CS		0.75

		Min	Max
PC mark	Cyl.-No.	- 2)	
Pulse wheel position (PC cam)	°CS	0 3)	
Tolerance +/-	°CS		0.20
P Tolerance +/-	°CS		0.75
Section B -			
Actuator test			
- Check values denoted by "P"			
- Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5V			
CONTROL-ROD PICKUP SETTING			
Test speed	1/min	0	
Setting value			
U/actual	V	3.100	
Control-rod travel	mm	12.95	13.05
P Control-rod travel	mm	12.90	13.10
Check value			
U/actual	V	1.700	
Control-rod travel	mm	5.90	6.40
P Control-rod travel	mm	5.85	6.45
Stop position			
U/actual	V	mind.	4)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1
SPEED SENSOR SIGNALS			
- Test with control rod in stop position			
Speed	1/min	60	
pos.amplitude	V	0.8	2.0
P pos.amplitude	V	0.6	3.0
Speed	1/min	600	
Difference Amplitude to Amplitude	V	max. 1.4	

Continued on next page

		Min	Max
S e c t i o n C -			
Injection pump with actuator			
- Check values denoted by "P"			
FUEL DELIVERY TEST AND SETTING			
Test point V1			
Speed	1/min	650	
U/actual	V	2.800	
Fuel delivery	cm3/1000str	295.0	297.0
Fuel delivery	cm3/1000str	292.0	300.0
Dispersion	cm3/1000str		8.0
P Dispersion	cm3/1000str		11.0
Test point L1			
Speed	1/min	300	
U/actual	V	1.340	1.460
Fuel delivery	cm3/1000str	24.0	28.0
Dispersion	cm3/1000str		5.0
P Dispersion	cm3/1000str		8.0

REMARKS

VOLVO-No.: 425 510

Dimension "Y" (Adjustment flange)	15.6	16.1

2) = No start-of-delivery mark.

3) = Setting of pulse-wheel position at start of delivery of cylinder No. 1.

4) = U/actual value min.: U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

BOSCH TEST SPECS. IP ASSEMBLY

TEST SHEET : VOL
Edition : 06.93 (2) EN
Type number : 0 412 826 020
Type number : 0 421 890 010
CUSTOMER IDENT. NO.:

Pump : PE 6 P 120 A 320 RS 8019
Regulator : RE 30
IP-ASSEMBLY: 0 402 896 008

Customer-specific details
Customer: VOLVO (LKW3047/1)
Engine: TD 123 EA/EB/EC
Output kW: 221/234/265
at 1/min:

		Min	Max
Test PREREQUISITES			
Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 078	
Inlet pressure	bar	2.5	2.6
Overflow	l/h	- -	- -
Calibrating nozzle-holder assembly		1 688 901 103	
Opening pressure	bar	207	210
Perforated plate diameter	mm	0.7	
Test pressure line		1 680 750 008	
Dimensions:			
Outer diameter.	mm	6.0	
x wall thickness	mm	2.0	
x length	mm	600	

TEST SPECIFICATIONS

Section A -
Setting values of injection pump
- Check values denoted by "P"
- No basic setting. Equal delivery setting under Section C.

PORT CLOSING

			Min	Max
	PC setting cyl.		1	
	Test pressure	bar	25	27
	Prestroke (from BDC)	mm	4.30	4.40
P	Prestroke (from BDC)	mm	4.25	4.45
	Control-rod travel	mm	10.0	11.0
	Cam sequence 1 - 5 - 3 - 6 - 2 - 4			
	PC difference	°CS	60 each	
	tolerance +/-	°CS		0.50
P	tolerance +/-	°CS		0.75

			Min	Max
	PC mark	Cyl.-No.	- 2)	
	Pulse wheel position (PC cam)	°CS	0 3)	
	Tolerance +/-	°CS		0.20
P	Tolerance +/-	°CS		0.75

Section B -

Actuator test
- Check values denoted by "P"
- Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5V

CONTROL-ROD PICKUP SETTING

	Test speed	1/min	0	
	Setting value			
	U/actual	V	3.100	
	Control-rod travel	mm	12.95	13.05
P	Control-rod travel	mm	12.90	13.10
	Check value			
	U/actual	V	1.700	
	Control-rod travel	mm	5.90	6.40
P	Control-rod travel	mm	5.85	6.45
	Stop position			
	U/actual	V	mind.	4)
	Control-rod travel	mm	0.5	1.0
P	Control-rod travel	mm	0.4	1.1

SPEED SENSOR SIGNALS

- Test with control rod in stop position

	Speed	1/min	60	
	pos.amplitude	V	0.8	2.0
P	pos.amplitude	V	0.6	3.0
	Speed	1/min	600	
	Difference Amplitude to Amplitude	V	max. 1.4	

Continued on next page

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		Min	Max

Section C -

Injection pump with actuator

- Check values denoted by "P"

FUEL DELIVERY TEST AND SETTING

	Test point V1			
	Speed	1/min	600	
	U/actual	V	3.100	
	Fuel delivery	cm3/1000str	345.0	347.0
	Fuel delivery	cm3/1000str	342.0	350.0
	Dispersion	cm3/1000str		8.0
P	Dispersion	cm3/1000str		11.0
	Test point L1			
	Speed	1/min	300	
	U/actual	V	1.340	1.460
	Fuel delivery	cm3/1000str	31.0	35.0
	Dispersion	cm3/1000str		5.0
P	Dispersion	cm3/1000str		8.0

REMARKS

VOLVO-No.: 479 887

Dimension "Y" (Adjustment flange)	15.6		16.1

2) = No start-of-delivery mark.

3) = Setting of pulse-wheel position at start of delivery of cylinder No. 1.

4) = U/actual value min.: U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

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BOSCH TEST SPECS. IP ASSEMBLY

Pump : PE 6 P 120 A 320 RS 8020
Regulator : RE 30
IP-ASSEMBLY: 0 402 896 009

TEST SHEET : VOL
Edition : 06.93 (2) EN
Type number : 0 412 826 021
Type number : 0 421 890 010
CUSTOMER IDENT. NO.:

Customer-specific details
Customer: VOLVO (LKW)
Engine: TD 123 E/ES, TD 103E/ES
Output kW: 262/290/210/235
at 1/min:

		Min	Max
Test PREREQUISITES			
Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 078	
Inlet pressure	bar	2.5	2.6
Overflow	l/h	- -	- -
Calibrating nozzle-holder assembly		1 688 901 103	
Opening pressure	bar	207	210
Perforated plate diameter	mm	0.7	
Test pressure line		1 680 750 008	
Dimensions:			
Outer diameter.	mm	6.0	
x wall thickness	mm	2.0	
x length	mm	600	

TEST SPECIFICATIONS

Section A -
Setting values of injection pump
- Check values denoted by "P"
- No basic setting. Equal delivery setting under Section C.

PORT CLOSING

PC setting cyl.		1	
Test pressure	bar	25	27
Prestroke (from BDC)	mm	3.95	4.05
P Prestroke (from BDC)	mm	3.90	4.10
Control-rod travel	mm	10.0	11.0
Cam sequence 1 - 5 - 3 - 6 - 2 - 4			
PC difference	°CS	60 each	
tolerance +/-	°CS		0.50
P tolerance +/-	°CS		0.75

	Min	Max
PC mark Cyl.-No.	- 2)	
Pulse wheel position (PC cam) °CS	0 3)	
Tolerance +/- °CS		0.20
P Tolerance +/- °CS		0.75

Section B -

Actuator test
- Check values denoted by "P"
- Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5V

CONTROL-ROD PICKUP SETTING

Test speed	1/min	0	
Setting value			
U/actual	V	3.100	
Control-rod travel	mm	12.95	13.05
P Control-rod travel	mm	12.90	13.10
Check value			
U/actual	V	1.700	
Control-rod travel	mm	5.90	6.40
P Control-rod travel	mm	5.85	6.45
Stop position			
U/actual	V	mind.	4)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1

SPEED SENSOR SIGNALS

- Test with control rod in stop position

Speed	1/min	60	
pos.amplitude	V	0.8	2.0
P pos.amplitude	V	0.6	3.0
Speed	1/min	600	
Difference Amplitude to Amplitude	V	max. 1.4	

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		Min	Max

Section C -

Injection pump with actuator

- Check values denoted by "P"

FUEL DELIVERY TEST AND SETTING

	Test point V1			
	Speed	1/min	600	
	U/actual	V	2.800	
	Fuel delivery	cm3/1000str	301.0	303.0
	Fuel delivery	cm3/1000str	298.0	306.0
	Dispersion	cm3/1000str		8.0
P	Dispersion	cm3/1000str		11.0
	Test point L1			
	Speed	1/min	250	
	U/actual	V	1.340	1.460
	Fuel delivery	cm3/1000str	20.0	24.0
	Dispersion	cm3/1000str		5.0
P	Dispersion	cm3/1000str		8.0

REMARKS

VOLVO-No.: 479 889

Dimension "Y"
(Adjustment flange) 15.6 16.1

2) = No start-of-delivery mark.

3) = Setting of pulse-wheel position at start of delivery of cylinder No. 1.

4) = U/actual value min.: U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

BOSCH TEST SPECS. IP ASSEMBLY

TEST SHEET : VOL
Edition : 06.93 (2) EN
Type number : 0 412 826 022
Type number : 0 421 890 010
CUSTOMER IDENT. NO.:

Pump : PE 6 P 120 A 320 RS 8020-1
Regulator : RE 30
IP-ASSEMBLY: 0 402 896 010

Customer-specific details
Customer: VOLVO LKW 3027/2-BUS8886
Engine: TD 123 ED, THD 103, KD
Output kW: 302/250
at 1/min:

		Min	Max
Test PREREQUISITES			
Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 078	
Inlet pressure	bar	2.5	2.6
Overflow	l/h	- -	- -
Calibrating nozzle-holder assembly		1 688 901 103	
Opening pressure	bar	207	210
Perforated plate diameter	mm	0.7	
Test pressure line		1 680 750 008	
Dimensions:			
Outer diameter.	mm	6.0	
x wall thickness	mm	2.0	
x length	mm	600	
TEST SPECIFICATIONS			
Section A -			
Setting values of injection pump			
- Check values denoted by "P"			
- No basic setting. Equal delivery setting under Section C.			
PORT CLOSING			
PC setting cyl.		1	
Test pressure	bar	25	27
Prestroke (from BDC)	mm	3.95	4.05
P Prestroke (from BDC)	mm	3.90	4.10
Control-rod travel	mm	10.0	11.0
Cam sequence		1 - 5 - 3 - 6 - 2 - 4	
PC difference	°CS	60 each	
tolerance +/-	°CS		0.50
P tolerance +/-	°CS		0.75

		Min	Max
PC mark	Cyl.-No.	- 2)	
Pulse wheel position (PC cam)	°CS	0 3)	
Tolerance +/-	°CS		0.20
P Tolerance +/-	°CS		0.75

Section B -

Actuator test
- Check values denoted by "P"
- Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5V

CONTROL-ROD PICKUP SETTING

Test speed	1/min	0	
Setting value			
U/actual	V	3.100	
Control-rod travel	mm	12.95	13.05
P Control-rod travel	mm	12.90	13.10
Check value			
U/actual	V	1.700	
Control-rod travel	mm	5.90	6.40
P Control-rod travel	mm	5.85	6.45
Stop position			
U/actual	V	mind.	4)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1

SPEED SENSOR SIGNALS

- Test with control rod in stop position

Speed	1/min	60	
pos.amplitude	V	0.8	2.0
P pos.amplitude	V	0.6	3.0
Speed	1/min	600	
Difference Amplitude to Amplitude	V	max. 1.4	

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		Min	Max
Section C -			
Injection pump with actuator			
- Check values denoted by "P"			
FUEL DELIVERY TEST AND SETTING			
Test point V1			
Speed	1/min	600	
U/actual	V	2.800	
Fuel delivery	cm3/1000str	301.0	303.0
Fuel delivery	cm3/1000str	298.0	306.0
Dispersion	cm3/1000str		8.0
P Dispersion	cm3/1000str		11.0
Test point L1			
Speed	1/min	300	
U/actual	V	1.340	1.460
Fuel delivery	cm3/1000str	29.0	33.0
Dispersion	cm3/1000str		5.0
P Dispersion	cm3/1000str		8.0

REMARKS

VOLVO-No.: 479 888

Dimension "Y" (Adjustment flange)	15.6	16.1

2) = No start-of-delivery mark.

3) = Setting of pulse-wheel position at start of delivery of cylinder No. 1.

4) = U/actual value min.: U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

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BOSCH TEST SPECS. IP ASSEMBLY

TEST SHEET : VOL
Edition : 06.93 (2) EN
Type number : 0 412 826 023
Type number : 0 421 890 010
CUSTOMER IDENT. NO.:

Pump : PE 6 P 120 A 320 RS 8021
Regulator : RE 30
IP-ASSEMBLY: 0 402 896 011

Customer-specific details
Customer: VOLVO (BUS 886)
Engine: THD 103 KD
Output kW: 250
at 1/min:

		Min	Max
Test PREREQUISITES			
Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 078	
Inlet pressure	bar	2.5	2.6
Overflow	l/h	- -	- -
Calibrating nozzle-holder assembly		1 688 901 103	
Opening pressure	bar	207	210
Perforated plate diameter	mm	0.7	
Test pressure line		1 680 750 008	
Dimensions:			
Outer diameter.	mm	6.0	
x wall thickness	mm	2.0	
x length	mm	600	
TEST SPECIFICATIONS			
Section A -			
Setting values of injection pump			
- Check values denoted by "P"			
- No basic setting. Equal delivery setting under Section C.			
PORT CLOSING			
PC setting cyl.		1	
Test pressure	bar	25	27
Prestroke (from BDC)	mm	3.95	4.05
P Prestroke (from BDC)	mm	3.90	4.10
Control-rod travel	mm	10.0	11.0
Cam sequence		1 - 5 - 3 - 6 - 2 - 4	
PC difference	°CS	60 each	
tolerance +/-	°CS		0.50
P tolerance +/-	°CS		0.75

		Min	Max
PC mark	Cyl.-No.	- 2)	
Pulse wheel position (PC cam)	°CS	0 3)	
Tolerance +/-	°CS		0.20
P Tolerance +/-	°CS		0.75
Section B -			
Actuator test			
- Check values denoted by "P"			
- Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5V			
CONTROL-ROD PICKUP SETTING			
Test speed	1/min	0	
Setting value			
U/actual	V	3.100	
Control-rod travel	mm	12.95	13.05
P Control-rod travel	mm	12.90	13.10
Check value			
U/actual	V	1.700	
Control-rod travel	mm	5.90	6.40
P Control-rod travel	mm	5.85	6.45
Stop position			
U/actual	V	mind.	4)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1
SPEED SENSOR SIGNALS			
- Test with control rod in stop position			
Speed	1/min	60	
pos.amplitude	V	0.8	2.0
P pos.amplitude	V	0.6	3.0
Speed	1/min	600	
Difference Amplitude to Amplitude	V	max. 1.4	

Continued on next page

		Min	Max

Section C -

Injection pump with actuator

- Check values denoted by "P"

FUEL DELIVERY TEST AND SETTING

	Test point V1			
	Speed	1/min	600	
	U/actual	V	2.800	
	Fuel delivery	cm3/1000str	301.0	303.0
	Fuel delivery	cm3/1000str	298.0	306.0
	Dispersion	cm3/1000str		8.0
P	Dispersion	cm3/1000str		11.0
	Test point L1			
	Speed	1/min	250	
	U/actual	V	1.340	1.460
	Fuel delivery	cm3/1000str	29.0	33.0
	Dispersion	cm3/1000str		5.0
P	Dispersion	cm3/1000str		8.0

REMARKS

VOLVO-No.: 425 515

Dimension "Y" (Adjustment flange)	15.6		16.1

2) = No start-of-delivery mark.

3) = Setting of pulse-wheel position at start of delivery of cylinder No. 1.

4) = U/actual value min.: U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

BOSCH TEST SPECS. IP ASSEMBLY

Pump : PE 6 P 120 A 320 RS 8022
Regulator : RE 30
IP-ASSEMBLY: 0 402 896 012

TEST SHEET : VOL
Edition : 06.93 (2) EN
Type number : 0 412 826 024
Type number : 0 421 890 010
CUSTOMER IDENT. NO.:

Customer-specific details
Customer: VOLVO (LKW 3113)
Engine: TD 103 E, ES
Output kW: 210/235
at 1/min:

		Min	Max
Test PREREQUISITES			
Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 078	
Inlet pressure	bar	2.5	2.6
Overflow	l/h	- -	- -
Calibrating nozzle-holder assembly		1 688 901 103	
Opening pressure	bar	207	210
Perforated plate diameter	mm	0.7	
Test pressure line		1 680 750 008	
Dimensions:			
Outer diameter.	mm	6.0	
x wall thickness	mm	2.0	
x length	mm	600	
TEST SPECIFICATIONS			
Section A -			
Setting values of injection pump			
- Check values denoted by "P"			
- No basic setting. Equal delivery setting under Section C.			
PORT CLOSING			
PC setting cyl.		1	
Test pressure	bar	25	27
Prestroke (from BDC)	mm	3.95	4.05
P Prestroke (from BDC)	mm	3.90	4.10
Control-rod travel	mm	10.0	11.0
Cam sequence 1 - 5 - 3 - 6 - 2 - 4			
PC difference °CS		60 each	
tolerance +/-°CS			0.50
P tolerance +/-°CS			0.75

		Min	Max
PC mark Cyl.-No.		- 2)	
Pulse wheel position (PC cam)	°CS	0 3)	
Tolerance +/-°CS			0.20
P Tolerance +/-°CS			0.75
Section B -			
Actuator test			
- Check values denoted by "P"			
- Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5V			
CONTROL-ROD PICKUP SETTING			
Test speed	1/min	0	
Setting value			
U/actual	V	3.100	
Control-rod travel	mm	12.95	13.05
P Control-rod travel	mm	12.90	13.10
Check value			
U/actual	V	1.700	
Control-rod travel	mm	5.90	6.40
P Control-rod travel	mm	5.85	6.45
Stop position			
U/actual	V	mind. 4)	
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1
SPEED SENSOR SIGNALS			
- Test with control rod in stop position			
Speed	1/min	60	
pos.amplitude	V	0.8	2.0
P pos.amplitude	V	0.6	3.0
Speed	1/min	600	
Difference Amplitude to Amplitude	V	max. 1.4	

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		Min	Max
Section C -			
Injection pump with actuator			
- Check values denoted by "P"			
FUEL DELIVERY TEST AND SETTING			
Test point V1			
Speed	1/min	600	
U/actual	V	2.800	
Fuel delivery	cm3/1000str	301.0	303.0
Fuel delivery	cm3/1000str	298.0	306.0
Dispersion	cm3/1000str		8.0
P Dispersion	cm3/1000str		11.0
Test point L1			
Speed	1/min	250	
U/actual	V	1.340	1.460
Fuel delivery	cm3/1000str	20.0	24.0
Dispersion	cm3/1000str		5.0
P Dispersion	cm3/1000str		8.0

REMARKS

VOLVO-No.: 425 515

Dimension "Y" (Adjustment flange)	15.6	16.1

2) = No start-of-delivery mark.

3) = Setting of pulse-wheel position at start of delivery of cylinder No. 1.

4) = U/actual value min.: U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

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BOSCH INJECTION PUMP TEST SPECIFICATIONS

Obsereve notes in remark colum

Test sheet	:	IVECO
Date of manufacture	:	
Edition	:	04.05.1992
Replaces	:	
Test oil	:	ISO 4113
Injection pump	:	VE4/11E1900R480
Type No.	:	0 460 414 998
Customer Ident.No.	:	

Customer-specific details

Customer	:	IVECO
Engine	:	840.47.2790
Output kW	:	
Speed 1/min	:	3800

TEST BENCH PREREQUISITES

Inlet pressure, bar	:	0.30...0.40
Calibrating nozzle-holder assembly >	:	1 688 901 116
Opening pressure > bar	:	207...210
Test pressure line	:	1 680 750 073
Outer diameter	:	6.00
x wall thickness >	:	2.00
x length > mm	:	450
Overflow valve	:	2 467 413 006
Test line (fuel-delivery actuator)	:	KDEP 1865/3
Test line (solenoid valve start of injection)	:	KDEP 1865/6

TEST PRECONDITIONS

Test oil return temp. > °C with thermometer	:	45
Test oil supply temperature > °C	:	35...40
Hold-up revolutions >1/min	:	1100
Feedback voltage mV	:	2500

ELECTRICAL TEST

Actuator
Connections 4 and 7
Test temperature:

15°...30°C, ohms	:	0.4...1.0
50°...70°C, ohms	:	0.45...1.1
Connections 4 and. ground, Mohms min.	:	1.0
Connections 7 and ground, Mohms min.	:	1.0
Connections 2 and 7 Mohms min.	:	1.0
Connections 4 and 6 Mohms min.	:	1.0

Control-collar travel sensor

Test temperature 15°...70°C	:	
Connections 2 and 3 kohms	:	1.0...3.0
Connections 1 and 3 kohms	:	0.5...2.0
Connections 1 and. ground, Mohms min.	:	1.0
Connections 2 and ground, Mohms min.	:	1.0
Connections 3 and ground, Mohms min.	:	1.0

Temperature sensor, fuel
Connentions 5 and 6
Test temperature:

15°...30°C, kohms	:	1.2...4.0
50°...70°C, kohms	:	0.3...1.2
Connections 5 and ground, Mohms min.	:	1.0
Connections 6 and ground Mohms min.	:	1.0

Solenoid valve, start of injection
Connections 1 and 2
Test temperature :

15°...30°C, ohms	:	14.3...17.3
50°...70°C, ohms	:	15.5...21.0
Starting stop mV	:	4120...4650
Shutoff stop mV	:	650...850

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Setting values of injection pump
Check values in brackets

Supply pump pressure:
Speed 1/min : 500
Checkbk. volt.
mV : 1950
Setting value, bar : 6.6...7.2

Timing device travel:
Speed 1/min : 500
Checkbk. volt
mV : 1952
Setting value, mm : 9.10...9.30

Full-load delivery :
1st temperature-conditioning
revolution 1/min : 1900
Checkbk. volt
mV : 2500
Output
temperature °C : 48
Speed 1/min : 750
Checkbk. volt
mV : 2050
Measuring
temperature °C : 46
Fuel delivery cm³/
> 1000s : 34.3...34.7
Dispersion cm³/ : 2.5
> 1000s :

Test specifications of injection pump
Check values in brackets

Supply pump pressure variations:

1st speed 1/min : 1900
Checkbk. volt
mV : 3500
Supply pump
pressure > bar : 8.5...9.1
> bar :

2st speed 1/min : 150
Checkbk. volt
mV : 2870
Supply pump
pressure > bar : mind.3.8

Timing device variations:

1st speed 1/min : 750
Checkbk. volt. mV : 2050
Timing device
travel mm : 8.9...11.3
> mm : (8.8...11.4)

2nd speed 1/min : 500
Checkbk. volt. mV : 1950
Timing device
travel mm :
> mm : (8.7...9.7)

3rd speed 1/min : 1900
Checkbk. volt. mV : 3500
Timing device
travel mm : 10.9...11.6
> mm : (11.4...13.0)
Solenoid valve

4.th speed 1/min : 900
Checkbk. volt. mV : 1420
Timing device
travel mm : max. 0,3
> mm :
Start of
injection, volts : 12

Overflow at overflow valve:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt. mV : 2500
Output
temperature °C : 41
Speed 1/min : 1900
Checkbk. volt. mV : 3500
Measuring
temperature °C : 43
Overflow : 40...60
> cm³/10s : (35...65)

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Fuel delivery variations:

1st temperature-conditioning		
revolution	1/min	: 100
Checkbk. volt	mV	: 2500
Output		
temperature	°C	: 41
Speed	1/min	: 1900
Checkbk. volt	mV	: 3500
Meßtemperatur	°C	: 43
Fuel delivery	cm³/	: 61.8...64.4
>	1000s	: (61.6...64.6)
Dispersion	cm³/	: 4.0
>	1000s.	:
2nd temperature-conditioning		
revolution	1/min	: 1900
Checkbk. volt	mV	: 2500
Output		
temperature	°C	: 45
Speed	1/min	: 1185
Checkbk. volt	mV	: 2170
Measuring		
temperature	°C	: 45
Fuel delivery	cm³/	: 29.0...33.0
>	1000s	: (28.7...33.3)
Dispersion	cm³/	: 2,5
>	1000s	: (3.5)
3rd temperature-conditioning		
revolution	1/min	: 2000
Checkbk. volt	mV	: 2500
Output		
temperature	°C	: 61
Speed	1/min	: 750
Checkbk. volt	mV	: 2480
Measuring		
temperature	°C	: 57
Fuel delivery	cm³/	:
>	1000s	: (37.0...41.0)
Dispersion	cm³/	:
>	1000s	: (5.0)
4th temperature-conditioning		
revolution	1/min	: 1900
Checkbk. volt	mV	: 2500
Output		
temperature	°C	: 45
Speed	1/min	: 900
Checkbk. volt	mV	: 2900
Measuring		
temperature	°C	: 45
Fuel delivery	cm³/	: 64.2...67.2
>	1000s	: (63.9...67.5)
Dispersion	cm³/	: 2.5
>	1000s	: (3.5)

Idle delivery:

1st temperature-conditioning		
revolution	1/min	: 1900
Checkbk. volt	mV	: 2500
Output		
temperature	°C	: 51
Speed	1/min	: 400
Checkbk. volt	mV	: 1670
Meßtemperatur	°C	: 49
Fuel delivery	cm³/	:
>	1000s	: (10.5...16.5)
Solenoid valve		
Start of		
injection, volts		: 12
Dispersion	cm³/	:
>	1000s	: (3.5)

Starting fuel delivery:

1st temperature-conditioning		
revolution	1/min	: 1900
Checkbk. volt	mV	: 2500
Output		
temperature	°C	: 51
Speed	1/min	: 100
Checkbk. volt	mV	: 2870
Measuring		
temperature	°C	: 49
Fuel delivery	cm³/	:
>	1000s	: 83.5
Solenoid valve		
Start of		
injection, volts		: 12

Stop test:

Speed	1/min	: 1100
Checkbk. volt	mV	: 3500
ELAB	volts	: 0
Fuel delivery	cm³/	:
max.	1000s	: 3.0

Shutoff solenoid:

Cut-in voltage		
min.> volts		: 10.0
Rated voltage,		
	volts	: 12.0

Dimensions for mounting and setting:

Description		
K	mm	:
KF	mm	: 6,2...6,6
SVS max.	mm	:
FH	mm	:
TS		: 1 467 010 410

D22

D22

BOSCH INJECTION PUMP TEST SPECIFICATIONS

Obsereve notes in remark colum

Test sheet	: ROW
Date of manufacture	:
Edition	: 01.06.1993
Replaces	:
Test oil	: ISO 4113
Injection pump	: VE4/11E2000R500
Type No.	: 0 460 414 997
Customer Ident.No.	:

Customer-specific details

Customer	: ROW
Engine	: Gemini 3 2.5Tdi
Output kW	:
Speed 1/min	:

TEST BENCH PREREQUISITES

Inlet pressure, bar	: 0,30...0,40
Calibrating nozzle-holder assembly >	: 1 688 901 116
Opening pressure > bar	: 207...210
Test pressure line	: 1 680 750 085
Outer diameter	: 6,00
x wall thickness >	: 2,20
x length > mm	: 350
Overflow valve	:
Test line (fuel-delivery actuator)	: 0 986 612 437 : (KDEP 1865/8)
Test line (solenoid valve start of injection)	: 0 986 612 438 : (KDEP 1865/9)

TEST PRECONDITIONS

Test oil return temp. > °C with thermometer	: 55
Test oil supply temperature > °C	: 42...47
Hold-up revolutions >1/min	: 1200
Feedback voltage mV	: 2500

ELECTRICAL TEST

Actuator
Connections 5 and 6
Test temperature:

15°...30°C, ohms	: 0,4...1,0
50°...70°C, ohms	: 0,45...1,1
Connections 5 and. ground, Mohms min.	: 1,0
Connections 5 and ground, Mohms min.	: 1,0
Connections 3 and 5 Mohms min.	: 1,0
Connections 3 and 7 Mohms min.	: 1,0

High-pressure compressor sensor
Sensor coils
Connections 1 and 2

Ohm	: 4,9...6,5
Connections 2 and 3 Ohm	: 4,9...6,5
Connections 1 and 3 Ohm	: 9,8...13,0
Connections 1 and. ground, Mohms min.	: 1,0
Connections 2 and ground, Mohms min.	: 1,0
Connections 3 and ground, Mohms min.	: 1,0

Temperature sensor, fuel
Connentions 4 and 7
Test temperature:

15°...30°C, kohms	: 1,2...4,0
50°...70°C, kohms	: 0,3...1,2
Connections 4 and ground, Mohms min.	: 1,0
Connections 7 and ground Mohms min.	: 1,0

Solenoid valve, start of injection
Connections 1 and 2
Test temperature :

15°...30°C, ohms	: 14,3...17,3
50°...70°C, ohms	: 15,5...21,0
Starting stop mV	: 4120...4650
Shutoff stop mV	: 650...850

D23

D23

Setting values of injection pump
Check values in brackets

Supply pump pressure:
Speed 1/min : 1000
Checkbk. volt.
mV : 3500
Setting value, bar : 6,42...6,8

Timing device travel:
Speed 1/min : 1000
Checkbk. volt
mV : 3500
Setting value, mm : 8,8...9,2

Full-load delivery :
1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt
mV : 2500
Output
temperature °C : 61
Speed 1/min : 750
Checkbk. volt
mV : 2430
Measuring
temperature °C : 57
Fuel delivery cm^3/
> 1000s : 53,9...54,3
Dispersion cm^3/ : 2,5
> 1000s :

Test specifications of injection pump
Check values in brackets

Supply pump pressure variations:

1st speed 1/min : 2000
Checkbk. volt
mV : 3500
Supply pump
pressure > bar : 7,5...8,1
> bar :

2st speed 1/min : 200
Checkbk. volt
mV : 2870
Supply pump
pressure > bar : 4,7...5,7
> bar :

Timing device variations:

1st speed 1/min : 1000
Checkbk. volt. mV : 3500
Timing device
travel mm :
> mm :

2nd speed 1/min : 2000
Checkbk. volt. mV : 3500
Timing device
travel mm : 11,6...12,8
> mm :

3rd speed 1/min : 1000
Checkbk. volt. mV : 1560
Timing device
travel mm : max. 0,5
> mm :
Solenoid valve
Start of
injection, volts : 12

4.th speed 1/min : 500
Checkbk. volt. mV : 2870
Timing device
travel mm : 6,4...7,4
> mm :

Overflow at overflow valve:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt. mV : 2500
Output
temperature °C : 51
Speed 1/min : 2000
Checkbk. volt. mV : 3500
Measuring
temperature °C : 53
Overflow : 110...165
> cm^3/10 :

D24

D24

Fuel delivery variations:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt mV : 2500
Output
temperature °C : 51
Speed 1/min : 2000
Checkbk. volt mV : 3500
Meßtemperatur °C : 53
Fuel delivery cm³/ : 68,7...70,7
> 1000s :
Dispersion cm³/ : 2,5
> 1000s. :

2nd temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 60
Speed 1/min : 1000
Checkbk. volt mV : 3200
Measuring
temperature °C : 56
Fuel delivery cm³/ : 78,4...81,4
> 1000s :
Dispersion cm³/ : 2,5
> 1000s :

3rd temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 750
Checkbk. volt mV : 2430
Measuring
temperature °C : 57
Fuel delivery cm³/ :
> 1000s :
Dispersion cm³/ :
> 1000s :

4th temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 500
Checkbk. volt mV : 2870
Measuring
temperature °C : 57
Fuel delivery cm³/ : 85,7...88,7
> 1000s :
Dispersion cm³/ : 3,0
> 1000s :

Idle delivery:
1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 550
Checkbk. volt mV : 1450
Meßtemperatur °C : 57
Fuel delivery cm³/ : 7,7...11,7
> 1000s :
Solenoid valve
Start of
injection, volts : 12
Dispersion cm³/ : 4,0
> 1000s :

Starting fuel delivery:
1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 65
Speed 1/min : 100
Checkbk. volt mV : 3130
Measuring
temperature °C : 61
Fuel delivery cm³/ :
> 1000s : 84,8
Solenoid valve
Start of
injection, volts : 12

Stop test:
Speed 1/min : 1000
Checkbk. volt mV : 3000
ELAB volts : 0
Fuel delivery cm³/ :
max. 1000s : 5,0

Shutoff solenoid:
Cut-in voltage
min.> volts : 10,0
Rated voltage,
volts : 12,0

Notes:
High-pressure compressor sensor
Testing only possible with ballast
EPS 910

Take note of test instructions
"Distributor pump for direct
injectors"!

Dimensions for mounting and setting:

Description		
K	mm	:
KF	mm	:
SVS max.	mm	:
FH	mm	:

E1

E1

BOSCH INJECTION PUMP TEST SPECIFICATIONS

Obsereve notes in remark colum

Test sheet	: VW
Date of manufacture	:
Edition	: 10.05.1994
Replaces	: 01.06.1993
Test oil	: ISO 4113
Injection pump	: VE4/11E2250R510
Type No.	: 0 460 404 994
Customer Ident.No.	:

Customer-specific details

Customer	: VW
Engine	: 028.C
Output kW	:
Speed 1/min	:

TEST BENCH PREREQUISITES

Inlet pressure, bar	: 0.30...0.40
Calibrating nozzle-holder assembly >	: 1 688 901 114
Opening pressure > bar	: 207...210
Test pressure line	: 1 680 750 085
Outer diameter	: 6.00
x wall thickness >	: 2.20
x length > mm	: 350
Overflow valve	: 2 467 413 006
Test line (fuel-delivery actuator)	: KDEP 1865/10
Test line (solenoid valve start of injection)	: KDEP 1190

TEST PRECONDITIONS

Test oil return temp. > °C with thermometer	: 55
Test oil supply temperature > °C	: 42...47
Hold-up revolutions >1/min	: 1200
Feedback voltage mV	: 2500

ELECTRICAL TEST

Actuator

Connections 5 and 6	
Test temperature:	
15°...30°C, ohms	: 0.4...1.0
50°...70°C, ohms	: 0.45...1.1
Connections 5 and. ground, Mohms min.	: 1.0
Connections 6 and ground, Mohms min.	: 1.0
Connections 3 and 5 Mohms min.	: 1.0
Connections 5 and 7 Mohms min.	: 1.0

High-pressure compressor sensor

Sensor coils	
Connections 3 and 2	
Ohms	: 4.9...6.5
Connections 1 and 2	
Ohms	: 4.9...6.5
Connections 1 and 3	
Ohms	: 9.8...13.0
Connections 1 and. ground, Mohms min.	: 1.0
Connections 2 and ground, Mohms min.	: 1.0
Connections 3 and ground, Mohms min.	: 1.0

Temperature sensor, fuel

Connentions 4 and 7	
Test temperature:	
15°...30°C, kohms	: 1.2...4.0
50°...70°C, kohms	: 0.3...1.2
Connections 4 and ground, Mohms min.	: 1.0
Connections 7 and ground Mohms min.	: 1.0

Solenoid valve, start of injection

Connections 1 and 2	
Test temperature	:
15°...30°C, ohms	: 14.3...17.3
50°...70°C, ohms	: 15.5...21.0
Starting stop mV	: 4120...4650
Shutoff stop mV	: 650...850

E2

E2

Setting values of injection pump
Check values in brackets

Supply pump pressure:
Speed 1/min : 500
Checkbk. volt.
mV : 2245
Setting value, bar : 6.2...7.2

Timing device travel:
Speed 1/min : 500
Checkbk. volt
mV : 2245
Setting value, mm : 10.8...11.0

Full-load delivery :
1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt
mV : 2500
Output
temperature °C : 61
Speed 1/min : 750
Checkbk. volt
mV : 2480
Measuring
temperature °C : 57
Fuel delivery cm³/
> 1000s : 38.8...39.2
Dispersion cm³/ : 2.5
> 1000s :

Test specifications of injection pump
Check values in brackets

Supply pump pressure variations:

1st speed 1/min : 2000
Checkbk. volt
mV : 3890
Supply pump
pressure > bar : 8.6...9.6
> bar :.

2st speed 1/min : 150
Checkbk. volt
mV : 2230
Supply pump
pressure > bar : mind. 3.5
> bar :

Timing device variations:

1st speed 1/min : 300
Checkbk. volt. mV : 2245
Timing device
travel mm :
> mm : (8.9...12.1)

2nd speed 1/min : 2000
Checkbk. volt. mV : 3890
Timing device
travel mm : 11.6...12.8
> mm : (11.4...13.0)

3rd speed 1/min : 1400
Checkbk. volt. mV : 1475
Timing device
travel mm : max. 0.5
> mm : (max. 0.8)
Solenoid valve
Start of
injection, volts : 12

4.th speed 1/min : 500
Checkbk. volt. mV : 2245
Timing device
travel mm : 10.8...11.0
> mm : (9.9...11.9)

5.th speed 1/min : 150
Checkbk. volt. mV : 2230
Timing device
travel mm :
> mm : (mind. 1.5)

Overflow at overflow valve:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt. mV : 2500
Output
temperature °C : 51
Speed 1/min : 2000
Checkbk. volt. mV : 3890
Measuring
temperature °C : 53
Overflow : 96...150
> cm³/10s : (83...165)

E3

E3

Fuel delivery variations:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt mV : 2500
Output
temperature °C : 51
Speed 1/min : 2000
Checkbk. volt mV : 3890
Meßtemperatur °C : 53
Fuel delivery cm³/ : 48.4...51.0
> 1000s : (47.9...51.)
Dispersion cm³/ : 2.5
> 1000s. :

2nd temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 60
Speed 1/min : 1000
Checkbk. volt mV : 2860
Measuring
temperature °C : 56
Fuel delivery cm³/ : 42.1...44.7
> 1000s : (41.9...44.9)
Dispersion cm³/ : 2.5
> 1000s :

3rd temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 750
Checkbk. volt mV : 2480
Measuring
temperature °C : 57
Fuel delivery cm³/ :
> 1000s : (37.7...40.3)
Dispersion cm³/ :
> 1000s :

4th temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 500
Checkbk. volt mV : 2245
Measuring
temperature °C : 57
Fuel delivery cm³/ : 36.9...39.5
> 1000s : (35.9...40,.)
Dispersion cm³/ : 3.0
> 1000s :

Idle delivery:
1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 500
Checkbk. volt mV : 1600
Meßtemperatur °C : 57
Fuel delivery cm³/ : 11.5...16.5
> 1000s : 11.0...17.0)
Solenoid valve
Start of
injection, volts : 12
Dispersion cm³/ : 4,0
> 1000s :

Starting fuel delivery:
1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 65
Speed 1/min : 100
Checkbk. volt mV : 2230
Measuring
temperature °C : 61
Fuel delivery cm³/ :
> 1000s : 30,4
Solenoid valve
Start of
injection, volts : 12

Stop test:
Speed 1/min : 750
Checkbk. volt mV : 2480
ELAB volts : 0
Fuel delivery cm³/ :
max. 1000s : 3.0
Start of

Shutoff solenoid:
Cut-in voltage
min.> volts : 10.0
Rated voltage,
volts : 12.0

Notes:
High-pressure compressor sensor
Testing only possible with ballast
EPS 910

Take note of test instructions
"Distributor pump for direct
injectors"!

Dimensions for mounting and setting:

Description
K mm :
KF mm :
SVS max. mm :
FH mm :

E4

E4

BOSCH TEST SPECS. IP ASSEMBLY

Pump : PES 5 M 55 C 320 RS 202
Regulator : RE 22
IP-ASSEMBLY: 0 400 195 001

TEST SHEET : MB
Edition : 11.93 EN
Type number : 0 410 055 971
Type number : 0 420 090 002
CUSTOMER IDENT. NO.:

Customer-specific details
Customer: MERCEDES BENZ
Engine: OM 605
Vehicle: C 250 D
Output kW: 83 KW

		Min	Max
Test PREREQUISITES			
Test oil inlet temperature	°C	38	42
Overflow valve		1 469 990 351	
Inlet pressure	bar	0.9	1.1
Overflow 1)	l/h	- -	- -
Calibrating nozzle-holder assembly		1 688 901 111	
Opening pressure	bar	147	150
Perforated plate diameter	mm	- -	- -
Test pressure line		1 680 750 014	
Dimensions:			
Outer diameter	mm	6.0	
x wall thickness	mm	2.0	
x length	mm	600	
TEST SPECIFICATIONS			

Section A -
Setting values of injection pump
- Check values denoted by "P"
- No basic setting. Equal delivery setting under Section C.

PORT CLOSING

PC setting cyl.		1	
Test pressure	bar	25	27
Prestroke (from BDC)	mm	1.70	1.80
P Prestroke (from BDC)	mm	1.65	1.85
Control-rod travel	mm	16.0	18.0
Cam sequence		1 - 2 - 4 - 5 - 3	
PC difference	°CS	0-72-144-216-288	
tolerance +/-	°CS		- -
P tolerance +/-	°CS		1.0

		Min	Max
PC mark	Cyl.-No.	-	
Pulse wheel position (PC cam)	°CS	16.5	
Tolerance +/-	°CS		0.20
P Tolerance +/-	°CS		0.30

Section B -

Actuator test
- Check values denoted by "P"
- Assembly warm-up time: 3 mins. at n = 600 1/min, Control-rod ca. 10 mm

CONTROL-ROD PICKUP SETTING

Test speed	1/min	0	
Setting value			
U/actual	V	3.100	
Control-rod travel	mm	12.45	12.55
P Control-rod travel	mm	12.40	12.60
Check value			
U/actual	V	1.700	
Control-rod travel	mm	5.25	5.75
P Control-rod travel	mm	5.20	5.80
Stop position			
U/actual	V	0.655	0.785
Control-rod travel	mm	1.0	1.0
P Control-rod travel	mm	1.0	1.0
Start position			
U/actual	V	4.385	4.615
Control-rod travel	mm	18.2	19.8
P Control-rod travel	mm	18.2	19.8

Continued on next page

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		Min	Max

Section C -

Injection pump with actuator

- Check values denoted by "P"

FUEL DELIVERY TEST AND SETTING

Test point V1

	Speed	1/min	1000	
	U/actual	V	3.250	
	Fuel delivery	cm3/1000str	35.0	36.0
P	Fuel delivery	cm3/1000str	33.5	37.5
	Dispersion	cm3/1000str		2.5
P	Dispersion	cm3/1000str		3.0
	Speed	1/min	315	
	U/actual	V	2.100	2.100
	Fuel delivery	cm3/1000str	3.0	9.0
	Dispersion	cm3/1000str		1.0
P	Dispersion	cm3/1000str		1.5

E6

BOSCH EP TEST VALUES

Please note information given under "Remarks"

Test sheet: Mercedes-Benz
Date of issue: 10.06.1994 EN

Combination no.: 0 402 648 898
Combination no.: 0 402 648 906
Combination no.: 0 402 648 908
Combination no.: 0 402 648 918
Injection pump designation: PE 8 P..LS 7838 and ..LS 7838-10

Combination no.: 0 402 648 893
Combination no.: 0 402 648 894
Combination no.: 0 402 648 895
Combination no.: 0 402 648 914
Combination no.: 0 402 648 915
Injection pump designation: PE 8 P..LS 7835 and ..LS 7835-10

Combination no.: 0 402 648 900
Combination no.: 0 402 648 901
Combination no.: 0 402 648 909
Combination no.: 0 402 648 910
Injection pump designation: PE 8 P..LS 7840 and ..LS 7840-10

Combination no.: 0 402 646 921
Combination no.: 0 402 646 924
Combination no.: 0 402 646 925
Combination no.: 0 402 646 931
Combination no.: 0 402 646 942
Combination no.: 0 402 646 950
Injection pump designation: PE 6 P..LS 7837 and ..LS 7837-10

Combination no.: 0 402 646 917
Combination no.: 0 402 646 926
Combination no.: 0 402 646 929
Combination no.: 0 402 646 922
Combination no.: 0 402 646 954
Combination no.: 0 402 646 930
Injection pump designation: PE 6 P..LS 7834 and ..LS 7834-10

Combination no.: 0 402 646 952
Combination no.: 0 402 646 953
Combination no.: 0 402 646 957
Combination no.: 0 402 646 958
Combination no.: 0 402 646 915
Combination no.: 0 402 646 916
Combination no.: 0 402 646 939
Combination no.: 0 402 646 940
Combination no.: 0 402 646 959
Combination no.: 0 402 646 960
Injection pump designation: PE 6 P..LS 7836 and ..LS 7836-10

...

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Combination no.: 0 402 746 913
Combination no.: 0 402 746 916
Combination no.: 0 402 746 919
Injection pump designation: PE 6 P..LS 7237 and ..LS 7237-10

Remarks:

Information on repair and testing is given in the following Service Information:

W 400/.., RQ(V)..PA
Mercedes-Benz series 400 with P pump and two-stage LDA, low output

Testoil-ISO 4113

BOSCH TEST SPECS. IP ASSEMBLY

Pump: PES 6 R 120/720 RS 1502
Regulator: RE 31
IP-ASSEMBLY: 0 401 496 001

TEST SHEET : 0 401 496 001
Edition : 12.94 (1) EN
Type number : 0 411 426 002
Type number : 0 421 890 200
CUSTOMER IDENT. NO.:

Customer-specific details
Customer: VOLVO-TRUCK(NKW-3110)
Engine: TD 163 ES, EJ
Output kW: 370
at 1/min:

		Min	Max
Test PREREQUISITES			
Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 078	
Inlet pressure	bar	2.4	2.6
Overflow	l/h	- -	- -
Calibrating nozzle-holder assembly		1 688 901 105	
Opening pressure	bar	207	210
Perforated plate diameter	mm	0.8	
Test pressure line		1 680 750 089	
Dimensions:			
Outer diameter.	mm	8.0	
x wall thickness	mm	2.5	
x length	mm	600	

Testoil-ISO 4113

TEST SPECIFICATIONS

Section A -
Setting values of injection pump
- Check values denoted by "P"
- No basic setting. Equal delivery setting under Section C.

PORT CLOSING

			Min	Max
	PC setting cyl.		1	
	Test pressure ba		30	32
	Prestroke (from BDC)	mm	5.35	5.45
P	Prestroke (from BDC)	mm	5.30	5.50
	Control-rod travel	mm	10.0	11.0
	Cam sequence		1 - 5 - 3 - 6 - 2 -4	
	PC difference	°CS	60 each	
	tolerance +/-	°CS		0.50
P	tolerance +/-	°CS		0.75

			Min	Max
	PC mark	Cyl.-No.	- 2)	
	Pulse wheel position (PC cam)	°CS	0 3)	
	Tolerance +/-	°CS		0.20
P	Tolerance +/-	°CS		0.75

Section B -

Actuator test
- Check values denoted by "P"
- Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5V

CONTROL-ROD PICKUP SETTING

	Test speed	1/min	0	
	Setting value			
	U/actual	V	3.100	
	Control-rod travel	mm	12.95	13.05
P	Control-rod travel	mm	12.90	13.10
	Check value			
	U/actual	V	1.700	
	Control-rod travel	mm	5.90	6.40
P	Control-rod travel	mm	5.85	6.45
	Stop position			
	U/actual	V	mind.	4)
	Control-rod travel	mm	0.5	1.0
P	Control-rod travel	mm	0.4	1.1

SPEED SENSOR SIGNALS

- Test with control rod in stop position

	Speed	1/min	60	
	pos.amplitude	V	0.8	2.0
P	pos.amplitude	V	0.6	3.0
	Speed	1/min	600	
	Difference Amplitude to Amplitude	V	max. 1.4	

Continued on next page

			Min	Max
Section C -				
Injection pump with actuator				
- Check values denoted by "P"				
FUEL DELIVERY TEST AND SETTING				
Test point V1				
Speed	1/min		550	
U/actual	V		2.950	
Fuel delivery	cm3/1000str		389.0	391.0
P Fuel delivery	cm3/1000str		386.0	394.0
Dispersion	cm3/1000str			6.0
P Dispersion	cm3/1000str			10.0
Test point L1				
Speed	1/min		300	
U/actual	V		1.470	1.590
Fuel delivery	cm3/1000str		17.0	23.0
Dispersion	cm3/1000str			7.0
P Dispersion	cm3/1000str			11.0

REMARKS

VOLVO-No.: 1 556 156-P03-RELASED

Dimension "Y" (Adjustment flange)	15.6	16.1

1) = Arrangement of pressure-relief valve: Pump side 4.1 (previous: pump side 1 rear).

2) = No start-of-delivery mark.

3) = Setting of pulse-wheel position at start of delivery of cylinder No. 1.

4) = U/actual value min: U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

Testoil-ISO 4113

BOSCH TEST SPECS. IP ASSEMBLY

Pump : PE 6 R 130/720 RS 1503
Regulator : RE 31
IP-ASSEMBLY: 0 401 496 002

TEST SHEET : 0 401 496 002
Edition : 12.94 (1) EN
Type number : 0 411 436 001
Type number : 0 421 890 201
CUSTOMER IDENT. NO.:

Customer-specific details
Customer: IVECO - UNIC
Engine: 8210.42.5000 (NKW)
Output kW:
at 1/min:

		Min	Max
Test PREREQUISITES			
Test oil inlet temperature	°C	38	42
Overflow valve		1 417 413 025	
Inlet pressure	bar	2.4	2.6
Overflow	l/h	-	-
Calibrating nozzle-holder assembly		1 688 901 105	
Opening pressure	bar	207	210
Perforated plate diameter	mm	0.8	
Test pressure line		1 680 750 075	
Dimensions:			
Outer diameter.	mm	8.0	
x wall thickness	mm	2.5	
x length	mm	1000	
TEST SPECIFICATIONS			
Section A -			
Setting values of injection pump			
- Check values denoted by "P"			
- No basic setting. Equal delivery setting under Section C.			
PORT CLOSING			
PC setting cyl.		1	
Test pressure	bar	25	27
Prestroke (from BDC)	mm	6.95	7.05
P Prestroke (from BDC)	mm	6.90	7.10
Control-rod travel	mm	13.0	14.0
Cam sequence 1 - 5 - 3 - 6 - 2 - 4			
PC difference °CS		60 each	
tolerance +/-°CS			0.50
P tolerance +/-°CS			0.75

		Min	Max
PC mark Cyl.-No.		- 2)	
Pulse wheel position (PC cam)	°CS	0 3)	
Tolerance +/-°CS			0.20
P Tolerance +/-°CS			0.75
Section B -			
Actuator test			
- Check values denoted by "P"			
- Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5 V			
CONTROL-ROD PICKUP SETTING			
Test speed	1/min	0	
Setting value			
U/actual	V	3.100	
Control-rod travel	mm	12.95	13.05
P Control-rod travel	mm	12.90	13.10
Check value			
U/actual	V	1.700	
Control-rod travel	mm	5.90	6.40
P Control-rod travel	mm	5.85	6.45
Stop position			
U/actual	V	mind.	4)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1
SPEED SENSOR SIGNALS			
- Test with control rod in stop position			
Speed	1/min	60	
pos.amplitude	V	0.8	2.0
P pos.amplitude	V	0.6	3.0
Speed	1/min	600	
Difference Amplitude to Amplitude	V	max. 1.4	

Continued on next page

Testoil-ISO 4113

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			Min	Max
Section C -				
Injection pump with actuator				
- Check values denoted by "P"				
FUEL DELIVERY TEST AND SETTING				
Test point V1				
Speed	1/min		950	
U/actual	V		3.218	
Fuel delivery	cm3/1000str		278.0	280.0
P Fuel delivery	cm3/1000str		275.0	283.0
Dispersion	cm3/1000str			12.0
P Dispersion	cm3/1000str			16.0
Test point L1				
Speed	1/min		300	
U/actual	V		1.250	1.370
Fuel delivery	cm3/1000str		21.0	27.0
Dispersion	cm3/1000str			6.0
P Dispersion	cm3/1000str			10.0
REMARKS				
Dimension "Y" (Adjustment flange)			15.6	16.1

1) = Setting, ▒Start-of-delivery in prestroke▒ according to value in control rod travel 13...14 mm.
Then test start-of-delivery difference at other control rod travels:

Control rod travel:	Start-of-delivery earlier:
7.9...8.1 mm	0.25...1.75°
4.9...5.1 mm	1.75 3.75°

2) = No start-of-delivery mark.

3) = Setting of pulse-wheel position at start of delivery of cylinder No. 1.

4) = U/actual value min.:
U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

Testoil-ISO 4113

BOSCH TEST SPECS. IP ASSEMBLY

Pump: PE 6 R 120/720 RS 1504
Regulator: RE 31
IP-ASSEMBLY 0 401 496 003

TEST SHEET : 0 401 496 003
Edition : 12.94 (1) EN
Type number : 0 411 426 003
Type number : 0 421 890 200
CUSTOMER IDENT. NO.:

Customer-specific details
Customer: VOLVO-TRUCK (NKW-3059)
Engine: TD 164
Output kW: 382
at 1/min:

		Min	Max
Test PREREQUISITES			
Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 078	
Inlet pressure	bar	2.4	2.6
Overflow	l/h	-	-
Calibrating nozzle-holder assembly		1 688 901 105	
Opening pressure	bar	207	210
Perforated plate diameter	mm	0.8	
Test pressure line		1 680 750 089	
Dimensions:			
Outer diameter.	mm	8.0	
x wall thickness	mm	2.5	
x length	mm	600	
TEST SPECIFICATIONS			
Section A -			
Setting values of injection pump			
- Check values denoted by "P"			
- No basic setting. Equal delivery setting under Section C.			
PORT CLOSING			
PC setting cyl.		1	
Test pressure	bar	30	32
Prestroke (from BDC)	mm	5.35	5.45
P Prestroke (from BDC)	mm	5.30	5.50
Control-rod travel	mm	10.0	11.0
Cam sequence 1 - 5 - 3 - 6 - 2 - 4			
PC difference	°CS	60 each	
tolerance +/-	°CS		0.50
P tolerance +/-	°CS		0.75

		Min	Max
PC mark Cyl.-No.		1 2)	
Pulse wheel position (PC cam)	°CS	0 3)	
Tolerance +/-	°CS		0.20
P Tolerance +/-	°CS		0.75
Section B -			
Actuator test			
- Check values denoted by "P"			
- Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5V			
CONTROL-ROD PICKUP SETTING			
Test speed	1/min	0	
Setting value			
U/actual	V	3.100	
Control-rod travel	mm	12.95	13.05
P Control-rod travel	mm	12.90	13.10
Check value			
U/actual	V	1.70	
Control-rod travel	mm	5.90	6.40
P Control-rod travel	mm	5.85	6.45
Stop position			
U/actual	V	mind.	4)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1
SPEED SENSOR SIGNALS			
- Test with control rod in stop position			
Speed	1/min	60	
pos.amplitude	V	0.8	2.0
P pos.amplitude	V	0.6	3.0
Speed	1/min	600	
Difference Amplitude to Amplitude	V	max. 1.4	

Continued on next page

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EAC

			Min	Max
Section C -				
Injection pump with actuator				
- Check values denoted by "P"				
FUEL DELIVERY TEST AND SETTING				
Test point V1				
Speed	1/min		525	
U/actual	V		2.950	
Fuel delivery	cm3/1000str		389.0	391.0
P Fuel delivery	cm3/1000str		386.0	394.0
Dispersion	cm3/1000str			6.0
P Dispersion	cm3/1000str			10.0
Test point L1				
Speed	1/min		265	
U/actual	V		1.570	1.690
Fuel delivery	cm3/1000str		17.0	23.0
Dispersion	cm3/1000str			7.0
P Dispersion	cm3/1000str			11.0

REMARKS

VOLVO-Nr.: 1 556 415-P04-PRELIMIN
Dimension "Y"
(Adjustment flange) 15.6 16.1

1) = Arrangement of pressure-relief valve:
Pump side 4.1 (previous: pump side 1 rear).

2) = No start-of-delivery mark.

3) = Setting of pulse-wheel position at start of delivery of cylinder No. 1.

4) = U/actual value min.:
U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

Testoil-ISO 4113

BOSCH TEST SPECS. IP ASSEMBLY

TEST SHEET : 0 402 196 703
Edition : 12.94 (1) EN
Type number : 0 412 026 727
Type number : 0 421 890 018
CUSTOMER IDENT. NO.:

Pump: PES 6 P 120 A 720 RS 3184
Regulator: RE 24
IP-ASSEMBLY: 0 402 196 703

Customer-specific details
Customer: JOHN DEERE
Engine: 6076 HRW 30
Output kW: 181 (LR3 Tractor
at 1/min:

		Min	Max
Test PREREQUISITES			
Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 057	
Inlet pressure	bar	1.4	1.6
Overflow	l/h	-	-
Calibrating nozzle-holder assembly		1 688 901 101	
Opening pressure	bar	207	210
Perforated plate diameter	mm	0.6	
Test pressure line		1 680 750 015	
Dimensions:			
Outer diameter.	mm	6.0	
x wall thickness	mm	1.5	
x length	mm	600	

Testoil-ISO 4113

TEST SPECIFICATIONS

Section A -
Setting values of injection pump
- Check values denoted by "P"
- No basic setting. Equal delivery setting under Section C.

PORT CLOSING

			Min	Max
	PC setting cyl.		1	
	Test pressure	bar	25	27
	Prestroke (from BDC)	mm	3.55	3.65
P	Prestroke (from BDC)	mm	3.50	3.70
	Control-rod travel	mm	9.0	12.0
	Cam sequence		1 - 5 - 3 - 6 - 2 - 4	
	PC difference	°CS	60 each	
	tolerance +/-	°CS		0.50
P	tolerance +/-	°CS		0.75

			Min	Max
	PC mark Cyl.-No.		1 2)	
	Pulse wheel position (PC cam)	°CS	10.5 3)	
	Tolerance +/-	°CS		0.20
P	Tolerance +/-	°CS		0.75

Section B -

Actuator test
- Check values denoted by "P"
- Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5V

CONTROL-ROD PICKUP SETTING

	Test speed	1/min	0	
	Setting value			
	U/actual	V	3.100	
	Control-rod travel	mm	12.95	13.05
P	Control-rod travel	mm	12.90	13.10
	Check value			
	U/actual	V	1.700	
	Control-rod travel	mm	5.90	6.40
P	Control-rod travel	mm	5.85	6.45
	Stop position			
	U/actual	V	mind.	4)
	Control-rod travel	mm	0.5	1.0
P	Control-rod travel	mm	0.4	1.1

SPEED SENSOR SIGNALS

- Test with control rod in stop position

	Speed	1/min	60	
	pos.amplitude	V	0.8	2.0
P	pos.amplitude	V	0.6	3.0
	Speed	1/min	600	
	Difference Amplitude to Amplitude	V	max. 1.4	

Continued on next page

			Min	Max
Section C -				
Injection pump with actuator				
- Check values denoted by "P"				
FUEL DELIVERY TEST AND SETTING				
Test point V1				
Speed	1/min		1100	
U/actual	V		2.710	
Fuel delivery	cm3/1000str		140.0	142.0
P Fuel delivery	cm3/1000str		137.0	145.0
Dispersion	cm3/1000str			5.0
P Dispersion	cm3/1000str			9.0
Test point L1				
Speed	1/min		425	
U/actual	V		1.340	1.460
Fuel delivery	cm3/1000str		18.0	24.0
Dispersion	cm3/1000str			6.0
P Dispersion	cm3/1000str			10.0

REMARKS

John Deere-Nr.: RE 57 372

Dimension "Y"
(Adjustment flange)

2) = Port-closing mark 10.5° camshaft after port closing of cylinder 1.

3) = Pulse wheel position 10.5° camshaft after port closing of cylinder No. 1.

4) = U/actual value min.: U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

Testoil-ISO 4113

BOSCH TEST SPECS. IP ASSEMBLY

TEST SHEET : 0 402 696 031
Edition : 11.94 (2) EN
Type number : 0 412 626 001
Type number : 0 421 890 353
CUSTOMER IDENT. NO.:

Pump : PE 6 H 120/320 LS 4
Regulator : RE 36
IP-ASSEMBLY: 0 402 696 031

Customer-specific details
Customer: MB
Engine: OM 441 LA
Output kW: 250
at 1/min:

		Min	Max
Test PREREQUISITES			
Test oil inlet temperature,	°C	38	42
Overflow valve		2 417 413 082	
Inlet pressure	bar	- -	- -
Overflow 1)	1/h	160	170
Calibrating nozzle-holder assembly		1 688 901 105	
Opening pressure	bar	207	210
Perforated plate diameter	mm	- -	
Test pressure line		1 680 750 089	
Dimensions:			
Outer diameter.	mm	8.0	
x wall thickness	mm	2.5	
x length	mm	600	
TEST SPECIFICATIONS			

Section A -
Setting values of injection pump
- Check values denoted by "P"
- No basic setting. Equal delivery setting under Section C.

PORT CLOSING

PC setting cyl.		6	
Test pressure	bar	30	32
Prestroke (from BDC)	mm	6.95	7.05
P Prestroke (from BDC)	mm	6.90	7.10
Control-rod travel	mm	10.0	11.0
Cam sequence 6 - 3 - 5 - 2 - 4 -1			
PC difference °CS		60 each	
tolerance +/-°CS		0.15	
P tolerance +/-°CS		0.30	

		Min	Max
PC mark Cyl.-No.		6 2)	
Nockenscheibe-Position (PC cam)	°CS	3)	
Tolerance +/-°CS			- -
P Tolerance +/-°CS			- -

Section B -

Actuator test
- Check values denoted by "P"
- Assembly warm-up time: 3 mins. at n = 600 1/min, Control-rod ca. 10 mm

CONTROL-ROD PICKUP SETTING

Test speed	1/min	0	
Setting value			
U/actual	V	3.100	
Control-rod travel	mm	12.95	13.05
P Control-rod travel	mm	12.90	13.10
Check value			
U/actual	V	1.700	
Control-rod travel	mm	5.90	6.40
P Control-rod travel	mm	5.85	6.45
Stop position			
U/actual	V	mind.	4)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1

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Testoil-ISO 4113

E17

		Min	Max

S e c t i o n C -

Injection pump with actuator

- Check values denoted by "P"

FUEL DELIVERY TEST AND SETTING

	Test point V1			
	Speed	1/min	1050	
	U/actual	V	3.100	
	Prestroke magnet -			
	Magnet stroke mm		8.0	
	Fuel delivery	cm3/1000str	354.0	356.0
P	Fuel delivery	cm3/1000str	351.0	359.0
	Dispersion	cm3/1000str		5.0
P	Dispersion	cm3/1000str		9.0
	Test point L1			
	Speed	1/min	300	
	U/actual	V	1.440	1.560
	Prestroke magnet -			
	Magnet stroke mm		8.0	
	Fuel delivery	cm3/1000str	22.0	28.0
	Dispersion	cm3/1000str		8.0
P	Dispersion	cm3/1000str		12.0

Testoil-ISO 4113

REMARKS

Dimension "Y" (Adjustment flange)		15.6	16.1

1) = Setting of overflow at full load (refer to measurement point V1).

2) = Start-of-ddelivery incipient fissure on FB cyl. 6. Tolerance +/- 0.10° NW.

3) = Setting of cam disk position: omitted.

4) = U/actual value min.: U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

E18

BOSCH TEST SPECS. IP ASSEMBLY

TEST SHEET : 0 402 696 032
Edition : 11.94 (1) EN
Type number : 0 412 626 002
Type number : 0 421 890 353
CUSTOMER IDENT. NO.:

Pump : PE 6 H 120/320 LS 4-1
Regulator : RE 36
IP-ASSEMBLY: 0 402 696 032

Customer-specific details
Customer: MB
Engine: OM 441 LA
Vehicle: 250
Output kW:

		Min	Max
Test PREREQUISITES			
Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 082	
Inlet pressure	bar	3.4	3.6
Overflow 1)	l/h	- -	- -
Calibrating nozzle-holder assembly		1 688 901 105	
Opening pressure	bar	207	210
Perforated plate diameter	mm	- -	- -
Test pressure line		1 680 750 089	
Dimensions:			
Outer diameter	mm	8.0	
x wall thickness	mm	2.5	
x length	mm	600	
TEST SPECIFICATIONS			

Testoil-ISO 4113

Section A -
Setting values of injection pump
- Check values denoted by "P"
- No basic setting. Equal delivery setting under Section C.

PORT CLOSING

PC setting cyl.		6	
Test pressure	bar	30	32
Prestroke (from BDC)	mm	6.95	7.05
P Prestroke (from BDC)	mm	6.90	7.10
Control-rod travel	mm	10.0	11.0
Cam sequence		6-3-5-2-4-1	
PC difference	°CS	60 each	
tolerance +/-	°CS		0.15
P tolerance +/-	°CS		0.30

	Min	Max
PC mark Cyl.-No.	6 2)	
Pulse wheel position (PC cam)	°CS	3)
Tolerance +/-	°CS	0.20
P Tolerance +/-	°CS	0.30

Section B -

Actuator test
- Check values denoted by "P"
- Assembly warm-up time: 3 mins. at n = 600 1/min, Control-rod ca. 10 mm

CONTROL-ROD PICKUP SETTING

Test speed	1/min	0	
Setting value U/actual	V	3.100	
Control-rod travel	mm	12.95	13.05
P Control-rod travel	mm	12.90	13.10
Check value			
U/actual	V	1.700	
Control-rod travel	mm	5.90	6.40
P Control-rod travel	mm	5.85	6.45
Stop position			
U/actual	V	mind.	4)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1

Continued on next page

		Min	Max
Section C -			
Injection pump with actuator			
- Check values denoted by "P"			
FUEL DELIVERY TEST AND SETTING			
Test point V1			
Speed	1/min	750	
U/actual	V	3.000	
Prestroke magnet - Magnet stroke	mm	7.0	
Fuel delivery	cm3/1000str	374.0	376.0
Fuel delivery	cm3/1000str	371.0	379.0
Dispersion	cm3/1000str		5.0
P Dispersion	cm3/1000str		9.0
Speed	1/min	300	
U/actual	V	1.440	1.560
Prestroke magnet - Magnet stroke	mm	8.0	
Fuel delivery	cm3/1000str	22.0	28.0
Dispersion	cm3/1000str		8.0
P Dispersion	cm3/1000str		12.0
REMARKS			
Dimension "Y" (Adjustment flange)		15.6	16.1

1) = Setting of overflow volume at full load omitted

2) = Start-of-ddelivery incipient fissure on FB cyl. 6. Tolerance +/- 0.10° NW.

3) = Setting of cam disk position: omitted.

4) = U/actual value min.: U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

Testoil-ISO 4113

BOSCH TEST SPECS. IP ASSEMBLY

Pump : PE 6 H 120/320 LS 4-2
Regulator : RE 36
IP-ASSEMBLY: 0 402 696 033

TEST SHEET : 0 402 696 033
Edition : 11.94 (1) EN
Type number : 0 412 626 003
Type number : 0 421 890 353
CUSTOMER IDENT. NO.:

Customer-specific details
Customer: MB
Engine: OM 441 LA
Output kW: 250
at 1/min:

		Min	Max
Test PREREQUISITES			
Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 082	
Inlet pressure	bar	3.4	3.6
Overflow 1)	l/h	- -	- -
Calibrating nozzle-holder assembly		1 688 901 105	
Opening pressure	bar	207	210
Perforated plate diameter	mm	- -	
Test pressure line		1 680 750 089	
Dimensions:			
Outer diameter	mm	8.0	
x wall thickness	mm	2.5	
x length	mm	600	
TEST SPECIFICATIONS			
Section A -			
Setting values of injection pump			
- Check values denoted by "P"			
- No basic setting. Equal delivery setting under Section C.			
PORT CLOSING			
PC setting cyl.		6	
Test pressure	bar	30	32
Prestroke (from BDC)	mm	6.95	7.05
P Prestroke (from BDC)	mm	6.90	7.10
Control-rod travel	mm	10.0	11.0
Cam sequence		6 - 3 - 5 - 2 - 4 - 1	
PC difference	°CS	60 each	
tolerance +/-	°CS		0.15
P tolerance +/-	°CS		0.30

		Min	Max
PC mark Cyl.-No.		6 2)	
Nockenscheibe-Position (PC cam)	°CS		3)
Tolerance +/-	°CS		- -
P Tolerance +/-	°CS		- -
Section B -			
Actuator test			
- Check values denoted by "P"			
- Assembly warm-up time: 3 mins. at n = 600 1/min, Control-rod ca. 10 mm			
CONTROL-ROD PICKUP SETTING			
Test speed	1/min	0	
Setting value			
U/actual	V	3.100	
Control-rod travel	mm	12.95	13.05
P Control-rod travel	mm	12.90	13.10
Check value			
U/actual	V	1.700	
Control-rod travel	mm	5.90	6.40
P Control-rod travel	mm	5.85	6.45
Stop position			
U/actual	V	mind.	4)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1

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E21

E21

			Min	Max

Section C -

Injection pump with actuator

- Check values denoted by "P"

FUEL DELIVERY TEST AND SETTING

Test point V1

	Speed	1/min	750	
	U/actual	V	3.000	
	Prestroke magnet - Magnet stroke	mm	7.0	
	Fuel delivery	cm3/1000str	374.0	376.0
P	Fuel delivery	cm3/1000str	371.0	379.0
	Dispersion	cm3/1000str		5.0
P	Dispersion	cm3/1000str		9,0
	Speed	1/min	300	
	U/actual	V	1.440	1.560
	Prestroke magnet - Magnet stroke	mm	8.0	
	Fuel delivery	cm3/1000str	22.0	28.0
	Dispersion	cm3/1000str		8.0
P	Dispersion	cm3/1000str		12.0

REMARKS

Dimension "Y" (Adjustment flange)		15.6	16.1

1) = Setting of overflow volume: omitted.

2) = Start-of-ddelivery incipient fissure on FB cyl. 6. Tolerance +/- 0.10° NW.

3) = Setting of cam disk position: omitted.

4) = U/actual value min: U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

Testoil-ISO 4113

E22

BOSCH TEST SPECS. IP ASSEMBLY

TEST SHEET : 0 402 696 801
Edition : 12.94 (5) EN
Type number : 0 412 626 838
Type number : 0 421 890 009
CUSTOMER IDENT. NO.:

Pump : PE 6 P 120 A 720 RS 7211
Regulator: RE 30
IP-ASSEMBLY: 0 402 696 801

Customer-specific details
Customer: SCANIA
Engine: DTC 1102, DSE 1170
Output kW:
at 1/min:

		Min	Max
Test PREREQUISITES			
Test oil inlet temperature	°C	38	42
Overflow valve		1 417 413 025	
Inlet pressure	bar	2.4	2.6
Overflow	l/h	-	-
Calibrating nozzle-holder assembly		1 688 901 104	
Opening pressure	bar	250	253
Perforated plate diameter	mm	0.7	
Test pressure line		1 680 750 008	
Dimensions:			
Outer diameter.	mm	6.0	
x wall thickness	mm	2.0	
x length	mm	600	
TEST SPECIFICATIONS			

Testoil-ISO 4113

Section A -
Setting values of injection pump
- Check values denoted by "P"
- No basic setting. Equal delivery setting under Section C.

PORT CLOSING

PC setting cyl.		1	
Test pressure	bar	25	27
Prestroke (from BDC)	mm	5.00	5.10
P Prestroke (from BDC)	mm	4.95	5.15
Control-rod travel	mm	10.0	11.0
Cam sequence		1 - 5 - 3 - 6 - 2 - 4	
PC difference	°CS	60 each	
tolerance +/-	°CS		0.30
P tolerance +/-	°CS		0.75

		Min	Max
PC mark	Cyl.-No.	1 2)	
Pulse wheel position (PC cam)	°CS	0 3)	
Tolerance +/-	°CS		0.20
P Tolerance +/-	°CS		0.75

Section B -

Actuator test
- Check values denoted by "P"
- Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5V

CONTROL-ROD PICKUP SETTING

Test speed	1/min	0	
Setting value			
U/actual	V	3.100	
Control-rod travel	mm	12.95	13.05
P Control-rod travel	mm	12.90	13.10
Check value			
U/actual	V	1.700	
Control-rod travel	mm	5.90	6.40
P Control-rod travel	mm	5.85	6.45
Stop position			
U/actual	V	mind.	4)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1

SPEED SENSOR SIGNALS

- Test with control rod in stop position			
Speed	1/min	60	
pos.amplitude	V	0.8	2.0
P pos.amplitude	V	0.6	3.0
Speed	1/min	600	
Difference Amplitude to Amplitude	V	max. 1.4	

Continued on next page

		Min	Max
S e c t i o n C -			
Injection pump with actuator			
- Check values denoted by "P"			
FUEL DELIVERY TEST AND SETTING (Observe "Remarks" Point 5), 6))			
Test point V1			
Speed	1/min	700	
U/actual	V	3.000	
Fuel delivery	cm3/1000str	247.0	249.0
P Fuel delivery	cm3/1000str	244.0	252.0
Dispersion	cm3/1000str		8.0
P Dispersion	cm3/1000str		12.0
Test point L1			
Speed	1/min	250	
U/actual	V	1,350	1,470
Fuel delivery	cm3/1000str	13.0	19.0
Dispersion	cm3/1000str		4.0
P Dispersion	cm3/1000str		8.0

REMARKS

SCANIA-No.: 1 328 037

	Min	Max
Dimension "Y" (Adjustment flange) (If provided; adjustment flange was introduced in the course of series production).	15.6	16.1

1) = Arrangement of pressure-relief valve: Pump side 4.2 (previous: pump side 2 rear).

2) = Start of delivery mark at start of delivery of cylinder No 1.

3) = Setting of pulse-wheel position at start of delivery of cylinder No. 1.

	Min	Max

REMARKS (Continued)

4) = U/actual value min.: U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

5) = Feed rate checking and adjustment with ROBO diaphragm. Connection of the ROBO diaphragm: Pump page 3.2 (previous: pump side 2).

6) = Delivery-valve holder:

* Valve spring pre-tension:	mm	3.2	3.4
* Allowed variation:	mm	3.0	3.5
* Required setting for new delivery-valve holders due to flattening:	mm	2.9	3.1

Testoil-ISO 4113

BOSCH TEST SPECS. IP ASSEMBLY

Pump : PE 6 P 120 A 320 RS 7874
Regulator : RE 30
IP-ASSEMBLY: 0 402 696 802

TEST SHEET : 0 402 696 802
Edition : 12.94 (1) EN
Type number : 0 412 626 913
Type number : 0 421 890 020
CUSTOMER IDENT. NO.:

Customer-specific details
Customer: Mercedes Benz
Engine: OM 401 LA (Krupp crane)
Output kW: 230
at 1/min:

		Min	Max
Test PREREQUISITES			
Test oil inlet temperature	°C	38	42
Overflow valve		1 417 413 025	
Inlet pressure	bar	1.4	1.6
Overflow 1)	l/h	- -	- -
Calibrating nozzle-holder assembly		1 688 901 105	
Opening pressure	bar	207	210
Perforated plate diameter	mm	0.8	
Test pressure line		1 680 750 075	
Dimensions:			
Outer diameter	mm	8.0	
x wall thickness	mm	2.5	
x length	mm	1000	

Testoil-ISO 4113

TEST SPECIFICATIONS

Section A -
Setting values of injection pump
- Check values denoted by "P"
- No basic setting. Equal delivery setting under Section C.

PORT CLOSING

			Min	Max
	PC setting cyl.		6	
	Test pressure	bar	25	27
	Prestroke (from BDC)	mm	5.20	5.30
P	Prestroke (from BDC)	mm	4.15	4.35
	Control-rod travel	mm	20.0	21.0
	Cam sequence 6 - 3 - 5 - 2 - 4 - 1			
	PC difference	°CS	60 each	
	tolerance +/-	°CS		0.30
P	tolerance +/-	°CS		0.75

			Min	Max
	PC mark Cyl.-No.		6	2)
	Pulse wheel position (PC cam)	°CS	0 3)	
	Tolerance +/-	°CS		0.20
P	Tolerance +/-	°CS		0.75

Section B -

Actuator test
- Check values denoted by "P"
- Assembly warm-up time: 3 mins. at n = 600 1/min, U actual = 2.5V

CONTROL-ROD PICKUP SETTING

	Test speed	1/min	0	
	Setting value			
	U/actual	V	3.100	
	Control-rod travel	mm	12.95	13.05
P	Control-rod travel	mm	12.90	13.10
	Check value			
	U/actual	V	1.700	
	Control-rod travel	mm	5.90	6.40
P	Control-rod travel	mm	5.85	6.45
	Stop position			
	U/actual	V	mind.	5)
	Control-rod travel	mm	0.5	1.0
P	Control-rod travel	mm	0.4	1.1

SPEED SENSOR SIGNALS

- Test with control rod in stop position

	Speed	1/min	60	
	pos.amplitude	V	0.8	2.0
P	pos.amplitude	V	0.6	3.0
	Speed	1/min	600	
	Difference Amplitude to Amplitude	V	max. 1.4	

Continued on next page

F1

			Min	Max
Section C -				
Injection pump with actuator				
- Check values denoted by "P"				
FUEL DELIVERY TEST AI TING				
Test point V1				
Speed	1/min		700	
U/actual	V		3.100	
Fuel delivery	cm3/1000str		229.0	231.0
P Fuel delivery	cm3/1000str		226.0	234.0
Dispersion	cm3/1000str			5.0
P Dispersion	cm3/1000str			9.0
Speed	1/min		350	
U/actual	V		1.375	1.495
Fuel delivery	cm3/1000str		10.0	16.0
Dispersion	cm3/1000str			6.0
P Dispersion	cm3/1000str			10.0

REMARKS

Mercedes Benz-Nr.: 0 250 743 602

Dimension "Y"
(Adjustment flange) 15.6 16.1
(If provided;
adjustment flange was
introduced in the course
of series production).

2) = Start-of-delivery invipient fissure on FB cyl. 6.

3) = Setting of pulse-wheel position at start of delivery of cylinder No. 6.

4) = U/actual value min:
U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

Testoil-ISO 4113

BOSCH TEST SPECS. IP ASSEMBLY

TEST SHEET : 0 402 698 031
Edition : 11.94 (2) EN
Type number : 0 412 628 001
Type number : 0 421 890 353
CUSTOMER IDENT. NO.:

Pump: PE 8 H 120/320 LS 3
Regulator: RE 36
IP-ASSEMBLY: 0 402 698 031

Customer-specific details
Customer: MB
Engine: OM 442 LA
Output kW: 370
at 1/min:

		Min	Max
Test PREREQUISITES			
Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 082	
Inlet pressure	bar	3.4	3.6
Overflow	l/h	-	-
Calibrating nozzle-holder assembly		1 688 901 105	
Opening pressure	bar	207	210
Perforated plate diameter	mm	- -	
Test pressure line		1 680 750 089	
Dimensions:			
Outer diameter.	mm	8.0	
x wall thickness	mm	2.5	
x length	mm	600	
TEST SPECIFICATIONS			
Section A -			
Setting values of injection pump			
- Check values denoted by "P"			
- No basic setting. Equal delivery setting under Section C.			
PORT CLOSING			
PC setting cyl.		8	
Test pressure	bar	30	32
Prestroke (from BDC)	mm	6.95	7.05
P Prestroke (from BDC)	mm	6.90	7.10
Control-rod travel	mm	10.0	11.0
Cam sequence		8-7-2-6-3-5-4-1	
PC difference	°CS	45 each	
tolerance +/-	°CS		0.15
P tolerance +/-	°CS		0.30
PC mark Cyl.-No.		8 2)	
Nockenscheibe-Position (PC cam)	°CS		3)
Tolerance +/-	°CS		- -
P Tolerance +/-	°CS		- -
Section B -			
Actuator test			
- Check values denoted by "P"			
- Assembly warm-up time: 3 mins. at n = 600 1/min, Control-rod ca. 10 mm			
CONTROL-ROD PICKUP SETTING			
Test speed	1/min	0	
Setting value			
U/actual	V	3.100	
Control-rod travel	mm	12.95	13.05
P Control-rod travel	mm	12.90	13.10
Check value			
U/actual	V	1.700	
Control-rod travel	mm	5.90	6.40
P Control-rod travel	mm	5.85	6.45
Stop position			
U/actual	V	mind.	4)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1

Continued on next page

Testoil-ISO 4113

F3

			Min	Max
Section C -				
Injection pump with actuator				
- Check values denoted by "P"				
FUEL DELIVERY TEST AND SETTING				
Test point V1				
Speed	1/min		750	
U/actual	V		2.800	
Prestroke magnet - Magnet stroke	mm		7.4	
Fuel delivery	cm3/1000str		340.0	342.0
P Fuel delivery	cm3/1000str		337.0	345.0
Dispersion	cm3/1000str			5.0
P Dispersion	cm3/1000str			9.0
Test point L1				
Speed	1/min		300	
U/actual	V		1.440	1.560
Prestroke magnet - Magnet stroke	mm		8.0	
Fuel delivery	cm3/1000str		20.0	26.0
Dispersion	cm3/1000str			8.0
P Dispersion	cm3/1000str			12.0

Testoil-ISO 4113

REMARKS

Dimension "Y" (Adjustment flange)	15.6	16.1

1) = Setting of overflow volume: omitted.

2) = Start-of-ddelivery incipient fissure on FB cyl. 8. Tolerance +/- 0.10° NW.

3) = Setting of cam disk position: omitted.

4) = U/actual value min.: U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

BOSCH TEST SPECS. IP ASSEMBLY

Pump: PE 8 H 120/320 LS 3-1
Regulator: RE 36
IP-ASSEMBLY 0 402 698 032

TEST SHEET : 0 402 698 032
Edition : 11.94 (1) EN
Type number : 0 412 628 002
Type number : 0 421 890 353
CUSTOMER IDENT. NO.:

Customer-specific details
Customer: MB
Engine: OM 442 LA
Output kW:
at 1/min:

		Min	Max
Test PREREQUISITES			
Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 082	
Inlet pressure	bar	3.4	3.6
Overflow 1)	l/h	-	-
Calibrating nozzle-holder assembly		1 688 901 105	
Opening pressure	bar	207	210
Perforated plate diameter	mm	-	-
Test pressure line		1 680 750 089	
Dimensions:			
Outer diameter	mm	8.0	
x wall thickness	mm	2.5	
x length	mm	600	
TEST SPECIFICATIONS			
Section A -			
Setting values of injection pump			
- Check values denoted by "P"			
- No basic setting. Equal delivery setting under Section C.			
PORT CLOSING			
PC setting cyl.		8	
Test pressure	bar	30	32
Prestroke (from BDC)	mm	6.95	7.05
P Prestroke (from BDC)	mm	6.90	7.10
Control-rod travel	mm	10.0	11.0
Cam sequence		8-7-2-6-3-5-4-1	
PC difference	°CS	45 each	
tolerance +/-	°CS		0.15
P tolerance +/-	°CS		0.30

		Min	Max
PC mark	Cyl.-No.	8 2)	
Nockenscheibe-Position (PC cam)	°CS	3)	
Tolerance +/-	°CS		- -
P Tolerance +/-	°CS		- -
Section B -			
Actuator test			
- Check values denoted by "P"			
- Assembly warm-up time: 3 mins. at n = 600 1/min, Control-rod ca. 10 mm			
CONTROL-ROD PICKUP SETTING			
Test speed	1/min	0	
Setting value U/actual	V	3.100	
Control-rod travel	mm	12.95	13.05
P Control-rod travel	mm	12.90	13.10
Check value U/actual	V	1.700	
Control-rod travel	mm	5.90	6.40
P Control-rod travel	mm	5.85	6.45
Stop position U/actual	V	mind.	4)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1

Continued on next page

Testoil-ISO 4113

F5

F5

			Min	Max
Section C -				
Injection pump with actuator				
- Check values denoted by "P"				
FUEL DELIVERY TEST AND SETTING				
Test point V1				
Speed	1/min		750	
U/actual	V		2.800	
Prestroke magnet - Magnet stroke	mm		7.4	
Fuel delivery	cm3/1000str		340.0	342.0
P Fuel delivery	cm3/1000str		337.0	345.0
Dispersion	cm3/1000str			5.0
P Dispersion	cm3/1000str			9.0
Test point L1				
Speed	1/min		300	
U/actual	V		1.440	1.560
Prestroke magnet - Magnet stroke	mm		8.0	
Fuel delivery	cm3/1000str		20.0	26.0
Dispersion	cm3/1000str			8.0
P Dispersion	cm3/1000str			12.0
REMARKS				
Dimension "Y" (Adjustment flange)			15.6	16.1

1) = Setting of overflow volume: omitted.

2) = Start-of-ddelivery incipient fissure on FB cyl. 6. Tolerance +/- 0.10° NW.

3) = Setting of cam disk position: omitted.

4) = U/actual value min.: U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

Testoil-ISO 4113

BOSCH TEST SPECS. IP ASSEMBLY

TEST SHEET : 0 402 698 033
Edition : 11.94 (2) EN
Type number : 0 412 628 003
Type number : 0 421 890 353
CUSTOMER IDENT. NO.:

Pump: PE 8 H 120/320 LS 3-2
Regulator: RE 36
IP-ASSEMBLY: 0 402 698 033

Customer-specific details
Customer: MB
Engine: OM 442 LA
Output kW: - -
at 1/min:

		Min	Max
Test PREREQUISITES			
Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 082	
Inlet pressure	bar	3.4	3.6
Overflow 1)	l/h	- -	- -
Calibrating nozzle-holder assembly		1 688 901 1051	
Opening pressure	bar	207	210
Perforated plate diameter	mm	- -	
Test pressure line		1 680 750 089	
Dimensions:			
Outer diameter.	mm	8.0	
x wall thickness	mm	2.5	
x length	mm	600	
TEST SPECIFICATIONS			

Section A -
Setting values of injection pump
- Check values denoted by "P"
- No basic setting. Equal delivery setting under Section C.

PORT CLOSING

	PC setting cyl.	8	
	Test pressure bar	30	32
	Prestroke (from BDC) mm	6.95	7.05
P	Prestroke (from BDC) mm	6.90	7.10
	Control-rod travel mm	10.0	11.0
	Cam sequence	8-7-2-6-3-5-4-1	
	PC difference °CS	45 each	
	tolerance +/-°CS		0.15
P	tolerance +/-°CS		0.30

		Min	Max
	PC mark Cyl.-No.	8 2)	
	Nockenscheibe-Position (PC cam) °CS	- -	3)
	Tolerance +/-°CS		- -
P	Tolerance +/-°CS		- -

Section B -

Actuator test
- Check values denoted by "P"
- Assembly warm-up time: 3 mins. at n = 600 1/min, Control-rod ca. 10 mm

CONTROL-ROD PICKUP SETTING

	Test speed	1/min 0	
	Setting value U/actual	V 3.100	
	Control-rod travel	mm 12.95	13.05
P	Control-rod travel	mm 12.90	13.10
	Check value		
	U/actual	V 1.700	
	Control-rod travel	mm 5.90	6.40
P	Control-rod travel	mm 5.85	6.45
	Stop position		
	U/actual	V mind.	4)
	Control-rod travel	mm 0.5	1.0
P	Control-rod travel	mm 0.4	1.1

Continued on next page

		Min	Max
S e c t i o n C -			
Injection pump with actuator			
- Check values denoted by "P"			
FUEL DELIVERY TEST AND SETTING			
Test point V1			
Speed	1/min	750	
U/actual	V	2.800	
Prestroke magnet - Magnet stroke	mm	7.4	
Fuel delivery	cm3/1000str	340.0	342.0
P Fuel delivery	cm3/1000str	337.0	345.0
Dispersion	cm3/1000str		5.0
P Dispersion	cm3/1000str		9.0
Test point L1			
Speed	1/min	300	
U/actual	V	1.440	1.560
Prestroke magnet - Magnet stroke	mm	8.0	
Fuel delivery	cm3/1000str	20.0	26.0
Dispersion	cm3/1000str		8.0
P Dispersion	cm3/1000str		12.0
REMARKS			
Dimension "Y" (Adjustment flange)		15.6	16.1

1) = Setting of overflow volume: omitted.

2) = Start-of-ddelivery incipient fissure on FB cyl. 8. Tolerance +/- 0.10° NW.

3) = Setting of cam disk position: omitted.

4) = U/actual value min: U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

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BOSCH TEST SPECS. IP ASSEMBLY

TEST SHEET : 0 402 698 802
Edition : 12.94 (7) EN
Type number : 0 412 628 826
Type number : 0 421 890 007
CUSTOMER IDENT. NO.:

Pump: PE 8 P 120 A 920/4 LS 7149
Regulator: RE 30
IP-ASSEMBLY: 0 402 698 802

Customer-specific details
Customer: SCANIA
Engine: DSC 1404
Output kW:
at 1/min:

		Min	Max
Test PREREQUISITES			
Test oil inlet temperature	°C	38	42
Overflow valve		1 417 413 025	
Inlet pressure	bar	1.4	1.6
Overflow	l/h	-	-
Calibrating nozzle-holder assembly		1 688 901 019	
Opening pressure	bar	207	210
Perforated plate diameter	mm	0.8	
Test pressure line		1 680 750 015	
Dimensions:			
Outer diameter.	mm	6.0	
x wall thickness	mm	1.5	
x length	mm	600	
TEST SPECIFICATIONS			

Testoil-ISO 4113

Section A -
Setting values of injection pump
- Check values denoted by "P"
- No basic setting. Equal delivery setting under Section C.

PORT CLOSING

PC setting cyl.		1	
Test pressure	bar	25	27
Prestroke (from BDC)	mm	5.00	5.10
P Prestroke (from BDC)	mm	4.95	5.15
Control-rod travel	mm	9.0	12.0
Cam sequence		1-2-7-3-4-5-6-8	
PC difference	°CS	45 each	
tolerance +/-	°CS		0.30
P tolerance +/-	°CS		0.75

		Min	Max
PC mark	Cyl.-No.	1 2)	
Pulse wheel position (PC cam)	°CS	0 3)	
Tolerance +/-	°CS		0.20
P Tolerance +/-	°CS		0.75

Section B -

Actuator test
- Check values denoted by "P"
- Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5V

CONTROL-ROD PICKUP SETTING

Test speed	1/min	0	
Setting value			
U/actual	V	3.100	
Control-rod travel	mm	12.95	13.05
P Control-rod travel	mm	12.90	13.10
Check value			
U/actual	V	1.700	
Control-rod travel	mm	5.90	6.40
P Control-rod travel	mm	5.85	6.45
Stop position			
U/actual	V	mind.	4)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1

SPEED SENSOR SIGNALS

- Test with control rod in stop position

Speed	1/min	60	
pos.amplitude	V	0.8	2.0
P pos.amplitude	V	0.6	3.0
Speed	1/min	600	
Difference Amplitude to Amplitude	V	max. 1.4	

Continued on next page

		Min	Max
S e c t i o n C -			
Injection pump with actuator			
- Check values denoted by "P"			

FUEL DELIVERY TEST AND SETTING
(Observe "Remarks" Point 5), 6))

	Test point V1			
	Speed	1/min	700	
	U/actual	V	3.180	
	Fuel delivery	cm3/1000str	226.0	228.0
P	Fuel delivery	cm3/1000str	223.0	231.0
	Dispersion	cm3/1000str		6.0
P	Dispersion	cm3/1000str		9.0
	Test point L1			
	Speed	1/min	250	
	U/actual	V	1.540	1.660
	Fuel delivery	cm3/1000str	15.0	21.0
	Dispersion	cm3/1000str		3.0
P	Dispersion	cm3/1000str		6.0

REMARKS

SCANIA No.: 397 567

Dimension "Y"
(Adjustment flange) 15.6 16.1
(If provided;
adjustment flange was
introduced in the course
of series production)

1) = Arrangement of pressure-relief valve:
Pump side 4.2 (previous: pump side 2 rear).

2) = Start of delivery mark at start of delivery of cylinder No 1.

3) = Setting of pulse-wheel position at start of delivery of cylinder No. 1.

	Min	Max

REMARKS (Continued)

4) = U/actual value min.:
U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

5) = Feed rate checking and adjustment with ROBO diaphragm. Connection of the ROBO diaphragm:
Pump page 3.2
(previous: pump side 2).

6) = Delivery-valve holder:
* Valve spring pre-tension: mm 3.2 3.4
* Allowed variation: mm 3.0 3.5
* Required setting for new delivery-valve holders due to flattening: mm 2.9 3.1

Testoil-ISO 4113

BOSCH TEST SPECS. IP ASSEMBLY

TEST SHEET : 0 402 698 804
Edition : 12.94 (6) EN
Type number : 0 412 628 845
Type number : 0 421 890 007
CUSTOMER IDENT. NO.:

Pump : PE 8 P 120 A 920/4 LS 7205
Regulator : RE 30
IP-ASSEMBLY: 0 402 698 804

Customer-specific details
Customer: SCANIA
Engine: DSC 1409, DSC 1416
Output kW:
at 1/min:

		Min	Max
Test PREREQUISITES			
Test oil inlet temperature	°C	38	42
Overflow valve		1 417 413 025	
Inlet pressure	bar	2.4	2.6
Overflow	l/h	-	-
Calibrating nozzle-holder assembly		1 688 901 104	
Opening pressure	bar	250	253
Perforated plate diameter	mm	0.7	
Test pressure line		1 680 750 008	
Dimensions:			
Outer diameter.	mm	6.0	
x wall thickness	mm	2.0	
x length	mm	600	
TEST SPECIFICATIONS			
Section A -			
Setting values of injection pump			
- Check values denoted by "P"			
- No basic setting. Equal delivery setting under Section C.			
PORT CLOSING			
PC setting cyl.		1	
Test pressure	bar	25	27
Prestroke (from BDC)	mm	5.00	5.10
P Prestroke (from BDC)	mm	4.95	5.15
Control-rod travel	mm	10.0	11.0
Cam sequence		1-2-7-3-4-5-6-8	
PC difference °CS		45 each	
tolerance +/-°CS			0.50
P tolerance +/-°CS			0.75
		Min	Max
PC mark Cyl.-No.		1 2)	
Pulse wheel position (PC cam)	°CS	0 3)	
Tolerance +/-°CS			0.20
P Tolerance +/-°CS			0.75
Section B -			
Actuator test			
- Check values denoted by "P"			
- Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5 V			
CONTROL-ROD PICKUP SETTING			
Test speed	1/min	0	
Setting value U/actual	V	3.100	
Control-rod travel	mm	12.95	13.05
P Control-rod travel	mm	12.90	13.10
Check value U/actual	V	1.700	
Control-rod travel	mm	5.90	6.40
P Control-rod travel	mm	5.85	6.45
Stop position U/actual	V	mind.	4)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1
SPEED SENSOR SIGNALS			
- Test with control rod in stop position			
Speed	1/min	60	
pos.amplitude	V	0.8	2.0
P pos.amplitude	V	0.6	3.0
Speed Difference	1/min	600	
Amplitude to Amplitude	V	max. 1.4	

Continued on next page

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		Min	Max

Section C -

Injection pump with actuator

- Check values denoted by "P"

FUEL DELIVERY TEST AND SETTING
(Observe "Remarks" Point 5), 6))

	Test point V1			
	Speed	1/min	700	
	U/actual	V	3.000	
	Fuel delivery	cm3/1000str	247.0	249.0
P	Fuel delivery	cm3/1000str	244.0	252.0
	Dispersion	cm3/1000str		8.0
P	Dispersion	cm3/1000str		12.0
	Test point L1			
	Speed	1/min	250	
	U/actual	V	1.350	1.470
	Fuel delivery	cm3/1000str	13.0	19.0
	Dispersion	cm3/1000str		4.0
P	Dispersion	cm3/1000str		8.0

REMARKS

SCANIA-No.: 1 328 039

Dimension "Y" (Adjustment flange) (If provided; adjustment flange was introduced in the course of series production)		15.6	16.1

1) = Arrangement of pressure-relief valve: Pump side 4.2 (previous: pump side 2 rear).

2) = Start of delivery mark at start of delivery of cylinder No 1.

3) = Setting of pulse-wheel position at start of delivery of cylinder No. 1.

	Min	Max

REMARKS (Continued)

4) = U/actual value min.: U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

5) = Feed rate checking and adjustment with ROBO diaphragm. Connection of the ROBO diaphragm: Pump page 3.2 (previous: pump side 2).

6) = Pressure valve holder: Setting of valve spring pretensioning omitted.

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BOSCH TEST SPECS. IP ASSEMBLY

TEST SHEET : 0 402 698 805
Edition : 12.94 (1) EN
Type number : 0 412 628 845
Type number : 0 421 890 019
CUSTOMER IDENT. NO.:

Pump : PE 8 P 120 A 920/4 LS 7205
Regulator: RE 30
IP-ASSEMBLY: 0 402 698 805

Customer-specific details
Customer: SCANIA
Engine: DSC 1409, DSC 1416
Output kW:
at 1/min:

		Min	Max
Test PREREQUISITES			
Test oil inlet temperature	°C	38	42
Overflow valve		1 417 413 025	
Inlet pressure	bar	2.4	2.6
Overflow	l/h	-	-
Calibrating nozzle-holder assembly		1 688 901 104	
Opening pressure	bar	250	253
Perforated plate diameter	mm	0.7	
Test pressure line		1 680 750 008	
Dimensions:			
Outer diameter.	mm	6.0	
x wall thickness	mm	2.0	
x length	mm	600	
TEST SPECIFICATIONS			
Section A -			
Setting values of injection pump			
- Check values denoted by "P"			
- No basic setting. Equal delivery setting under Section C.			
PORT CLOSING			
PC setting cyl.		1	
Test pressure	bar	25	27
Prestroke (from BDC)	mm	5.00	5.10
P Prestroke (from BDC)	mm	4.95	5.15
Control-rod travel	mm	10.0	11.0
Cam sequence		1-2-7-3-4-5-6-8	
PC difference °CS		45 each	
tolerance +/-°CS			0.45
P tolerance +/-°CS			0.75

		Min	Max
PC mark	Cyl.-No.	1 2)	
Pulse wheel position (PC cam)	°CS	0 3)	
Tolerance +/-°CS			0.20
P Tolerance +/-°CS			0.75
Section B -			
Actuator test			
- Check values denoted by "P"			
- Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5V			
CONTROL-ROD PICKUP SETTING			
Test speed	1/min	0	
Setting value			
U/actual	V	3.100	
Control-rod travel	mm	12.95	13.05
P Control-rod travel	mm	12.90	13.10
Check value			
U/actual	V	1.700	
Control-rod travel	mm	5.90	6.40
P Control-rod travel	mm	5.85	6.45
Stop position			
U/actual	V	mind.	4)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1
SPEED SENSOR SIGNALS			
- Test with control rod in stop position			
Speed	1/min	60	
pos.amplitude	V	0.8	2.0
P pos.amplitude	V	0.6	3.0
Speed	1/min	600	
Difference Amplitude to Amplitude	V	max. 1.4	

Continued on next page

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(On our copy, revolution norm at test point L1 is missing).

		Min	Max
Section C -			
Injection pump with actuator			
- Check values denoted by "P"			
FUEL DELIVERY TEST AND SETTING (Observe "Remarks" Point 5), 6))			
Test point V1			
Speed	1/min	700	
U/actual	V	3.000	
Fuel delivery	cm3/1000str	247.0	249.0
P Fuel delivery	cm3/1000str	244.0	252.0
Dispersion	cm3/1000str		8.0
P Dispersion	cm3/1000str		12.0
Test point L1			
Speed	1/min	250	
U/actual	V	1,350	1,470
Fuel delivery	cm3/1000str	13.0	19.0
Dispersion	cm3/1000str		4.0
P Dispersion	cm3/1000str		8.0

REMARKS

SCANIA-No.: 1 361 306

	Min	Max
Dimension "Y" (Adjustment flange)	15.6	16.1

1) = Arrangement of pressure-relief valve: Pump side 4.2 (previous: pump side 2 rear).

2) = Start of delivery mark at start of delivery of cylinder No 1.

3) = Setting of pulse-wheel position at start of delivery of cylinder No. 1.

	Min	Max

REMARKS (Continued)

4) = U/actual value min.: U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

5) = Feed rate checking and adjustment with ROBO diaphragm. Connection of the ROBO diaphragm: Pump page 3.2 (previous: pump side 2).

6) = Pressure valve holder:
1W8 Setting of valve spring pretensioning omitted.

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BOSCH TEST SPECS. IP ASSEMBLY

TEST SHEET : 0 402 698 806
Edition : 12.94 (1) EN
Type number : 0 412 628 884
Type number : 0 421 890 022
CUSTOMER IDENT. NO.:

Pump: PE 8 P 120 A 920/4 LS 7331
Regulator: RE 30
IP-ASSEMBLY: 0 402 698 806

Customer-specific details
Customer: SCANIA
Engine: DSC 1409, DSC 1416
Output kW:
at 1/min:

		Min	Max
Test PREREQUISITES			
Test oil inlet temperature	°C	38	42
Overflow valve		1 417 413 025	
Inlet pressure	bar	2.4	2.6
Overflow	l/h	-	-
Calibrating nozzle-holder assembly		1 688 901 104	
Opening pressure	bar	250	253
Perforated plate diameter	mm	0.7	
Test pressure line		1 680 750 008	
Dimensions:			
Outer diameter.	mm	6.0	
x wall thickness	mm	2.0	
x length	mm	600	
TEST SPECIFICATIONS			

Testoil-ISO 4113

Section A -
Setting values of injection pump
- Check values denoted by "P"
- No basic setting. Equal delivery setting under Section C.

PORT CLOSING

PC setting cyl.		1	
Test pressure	bar	25	27
Prestroke (from BDC)	mm	5.00	5.10
P Prestroke (from BDC)	mm	4.95	5.15
Control-rod travel	mm	10.0	11.0
Cam sequence		1-2-7-3-4-5-6-8	
PC difference	°CS	45 each	
tolerance +/-	°CS		0.50
P tolerance +/-	°CS		0.75

		Min	Max
PC mark	Cyl.-No.	1 2)	
Pulse wheel position (PC cam)	°CS	0 3)	
Tolerance +/-	°CS		0.20
P Tolerance +/-	°CS		0.75

Section B -

Actuator test
- Check values denoted by "P"
- Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5V

CONTROL-ROD PICKUP SETTING

Test speed	1/min	0	
Setting value			
U/actual	V	3.100	
Control-rod travel	mm	12.95	13.05
P Control-rod travel	mm	12.90	13.10
Check value			
U/actual	V	1.700	
Control-rod travel	mm	5.90	6.40
P Control-rod travel	mm	5.85	6.45
Stop position			
U/actual	V	mind.	4)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1

SPEED SENSOR SIGNALS

- Test with control rod in stop position

Speed	1/min	60	
pos.amplitude	V	0.8	2.0
P pos.amplitude	V	0.6	3.0
Speed	1/min	600	
Difference Amplitude to Amplitude	V	max. 1.4	

Continued on next page

		Min	Max
S e c t i o n C -			
Injection pump with actuator			
- Check values denoted by "P"			
FUEL DELIVERY TEST AND SETTING (Observe "Remarks" Point 5), 6))			
Test point V1			
Speed	1/min	700	
U/actual	V	3.000	
Fuel delivery	cm3/1000str	247.0	249.0
P Fuel delivery	cm3/1000str	244.0	252.0
Dispersion	cm3/1000str		8.0
P Dispersion	cm3/1000str		12.0
Test point L1			
Speed	1/min	250	
U/actual	V	1.350	1.470
Fuel delivery	cm3/1000str	13.0	19.0
Dispersion	cm3/1000str		4.0
P Dispersion	cm3/1000str		8.0

REMARKS

SCANIA No.: 1 362 097

		Min	Max
Dimension "Y" (Adjustment flange)		15.6	16.1

1) = Arrangement of pressure-relief valve:
Pump side 4.2 (previous: pump side 2 rear).

2) = Start of delivery mark at start of delivery of cylinder No 1.

3) = Setting of pulse-wheel position at start of delivery of cylinder No. 1.

4) = U/actual value min.:
U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

		Min	Max

REMARKS (Continued)

5) = Feed rate checking and adjustment with ROBO diaphragm. Connection of the ROBO diaphragm:
Pump page 3.2
(previous: pump side 2).

6) = Pressure valve holder:
Setting of valve spring pretensioning omitted.

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BOSCH TEST SPECS. IP ASSEMBLY

TEST SHEET : 0 402 795 201
Edition : 10.94 (1) EN
Type number : 0 412 725 201
Type number : 0 421 890 354
CUSTOMER IDENT. NO.:

Pump : PES 5 H 120/720/3 LS 1002
Regulator : RE 33
IP-ASSEMBLY: 0 402 795 201

Customer-specific details
Customer: MAN
Engine: D 2865 LF 09
Output kW: - -
at 1/min:

		Min	Max
Test PREREQUISITES			
Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 082	
Inlet pressure	bar	- -	- -
Overflow 1)	l/h	160	170
Calibrating nozzle-holder assembly		1 688 901 105	
Opening pressure	bar	207	210
Perforated plate diameter	mm	- -	
Test pressure line		1 680 750 089	
Dimensions:			
Outer diameter.	mm	8.0	
x wall thickness	mm	2.5	
x length	mm	600	

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TEST SPECIFICATIONS

Section A -
Setting values of injection pump
- Check values denoted by "P"
- No basic setting. Equal delivery setting under Section C.

PORT CLOSING

PC setting cyl.		5	
Test pressure	bar	30	32
Prestroke (from BDC)	mm	9.94	10.04
P Prestroke (from BDC)	mm	9.89	10.09
Control-rod travel	mm	10.0	11.0
Cam sequence		1 - 3 - 5 - 4 - 2	
PC difference	°CS	72 each	
tolerance +/-	°CS		0.15
P tolerance +/-	°CS		0.30

	Min	Max
PC mark Cyl.-No.	- 2)	
Nockenscheibe-Position (PC cam) °CS	0 3)	
Tolerance +/- °CS	0	0.10
P Tolerance +/- °CS		- -

Section B -

Actuator test
- Check values denoted by "P"
- Assembly warm-up time: 3 mins. at n = 600 1/min, Control-rod ca. 10 mm

CONTROL-ROD PICKUP SETTING

Test speed	1/min	0	
Setting value			
U/actual	V	3.100	
Control-rod travel	mm	12.95	13.05
P Control-rod travel	mm	12.90	13.10
Check value			
U/actual	V	1.700	
Control-rod travel	mm	5.90	6.40
P Control-rod travel	mm	5.85	6.45
Stop position			
U/actual	V	mind.	4)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1

Continued on next page

Section C -

Injection pump with actuator

- Check values denoted by "P"

FUEL DELIVERY TEST AND SETTING

			Min	Max
	Test point V1			
	Speed	1/min	750	
	U/actual	V	3.350	
	Prestroke magnet - Magnet stroke	mm	10.0	
	Fuel delivery	cm3/1000str	331.0	333.0
P	Fuel delivery	cm3/1000str	328.0	336.0
	Dispersion	cm3/1000str		5.0
P	Dispersion	cm3/1000str		9.0
	Test point L1			
	Speed	1/min	300	
	U/actual	V	1.460	1.580
	Prestroke magnet - Magnet stroke	mm	7.2	
	Fuel delivery	cm3/1000str	27.0	33.0
	Dispersion	cm3/1000str		8.0
P	Dispersion	cm3/1000str		12.0

REMARKS

		Min	Max
	Dimension "Y" (Adjustment flange)	15.6	16.1

1) = Setting of overflow at full load (refer to measurement point V1).

2) = No start-of-delivery mark.

3) = Setting of cam disk position: on FB cyl. 5.

4) = U/actual value min: U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

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BOSCH TEST SPECS. IP ASSEMBLY

TEST SHEET : 0 402 796 033
Edition : 11.94 (2) EN
Type number : 0 412 726 004
Type number : 0 421 890 356
CUSTOMER IDENT. NO.:

Pump : PES 6 H 120/720 LS 7
Regulator: RE 36
IP-ASSEMBLY 0 402 796 033

Customer-specific details
Customer: MB
Engine: OM 447 LA
Output kW: - -
at 1/min:

		Min	Max
Test PREREQUISITES			
Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 082	
Inlet pressure	bar	3.4	3.6
Overflow 1)	l/h	- -	- -
Calibrating nozzle-holder assembly		1 688 901 105	
Opening pressure	bar	207	210
Perforated plate diameter	mm	- -	
Test pressure line		1 680 750 089	
Dimensions:			
Outer diameter.	mm	8.0	
x wall thickness	mm	2.5	
x length	mm	600	
TEST SPECIFICATIONS			
Section A -			
Setting values of injection pump			
- Check values denoted by "P"			
- No basic setting. Equal delivery setting under Section C.			
PORT CLOSING 2)			
PC setting cyl.		6	
Test pressure	bar	30	32
Prestroke (from BDC)	mm	6.95	7.05
P Prestroke (from BDC)	mm	6.90	7.10
Control-rod travel	mm	10.0	11.0
Cam sequence 6 - 2 - 4 - 1 - 5 - 3			
PC difference °CS		60 each	
tolerance +/-°CS			0.15
P tolerance +/-°CS			0.30

		Min	Max
PC mark	Cyl.-No.	6 2)	
Cam disk position (PC cam)	°CS	- -	3)
Tolerance +/-°CS			- -
P Tolerance +/-°CS			- -
Section B -			
Actuator test			
- Check values denoted by "P"			
- Assembly warm-up time: 3 mins. at n = 600 1/min, Control-rod ca. 10 mm			
CONTROL-ROD PICKUP SETTING			
Test speed	1/min	0	
Setting value			
U/actual	V	3.100	
Control-rod travel	mm	12.95	13.05
P Control-rod travel	mm	12.90	13.10
Check value			
U/actual	V	1.700	
Control-rod travel	mm	5.90	6.40
P Control-rod travel	mm	5.85	6.45
Stop position			
U/actual	V	mind.	4)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1

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Section C -

Injection pump with actuator

- Check values denoted by "P"

FUEL DELIVERY TEST AND SETTING

			Min	Max
	Test point V1			
	Speed	1/min	800	
	U/actual	V	2.650	
	Prestroke magnet - Magnet stroke	mm	9.0	
	Fuel delivery	cm3/1000str	301.0	303.0
P	Fuel delivery	cm3/1000str	298.0	306.0
	Dispersion	cm3/1000str		5.0
P	Dispersion	cm3/1000str		9.0
	Test point L1			
	Speed	1/min	300	
	U/actual	V	1.380	1.500
	Prestroke magnet - Magnet stroke	mm	9.0	
	Fuel delivery	cm3/1000str	22.0	28.0
	Dispersion	cm3/1000str		8.0
P	Dispersion	cm3/1000str		12.0

REMARKS

Dimension "Y" (Adjustment flange)	15.6	16.1

1) = Setting of overflow volume: omitted.

2) = Start-of-ddelivery incipient fissure on FB cyl. 6. Tolerance +/- 0.30° NW.

3) = Setting of cam disk position: omitted.

4) = U/actual value min.: U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

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BOSCH TEST SPECS. IP ASSEMBLY

TEST SHEET : 0 402 796 034
Edition : 11.94 (1) EN
Type number : 0 412 726 005
Type number : 0 421 890 355
CUSTOMER IDENT. NO.:

Pump : PE 6 H 120/320 RS 8
Regulator: RE 36
IP-ASSEMBLY: 0 402 796 034

Customer-specific details
Customer: MAN
Engine: D 0826 LUH 11
Output kW: 162
at 1/min:

		Min	Max
Test PREREQUISITES			
Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 082	
Inlet pressure	bar	3.4	3.6
Overflow	l/h	-	-
Calibrating nozzle-holder assembly		1 688 901 105	
Opening pressure	bar	207	210
Perforated plate diameter	mm	- -	
Test pressure line		1 680 750 089	
Dimensions:			
Outer diameter.	mm	8.0	
x wall thickness	mm	2.5	
x length	mm	600	
TEST SPECIFICATIONS			
Section A -			
Setting values of injection pump			
- Check values denoted by "P"			
- No basic setting. Equal delivery setting under Section C.			
PORT CLOSING			
PC setting cyl.		1	
Test pressure	bar	30	32
Prestroke (from BDC)	mm	7.95	8.05
P Prestroke (from BDC)	mm	7.90	8.10
Control-rod travel	mm	10.0	11.0
Cam sequence 1 - 5 - 3 - 6 - 2 - 4			
PC difference °CS		60 each	
tolerance +/-°CS			0.15
P tolerance +/-°CS			0.30

			Min	Max
PC mark	Cyl.-No.		1 2)	
Cam disk position (PC cam)	°CS		0 3)	
Tolerance +/-°CS				- -
P Tolerance +/-°CS				- -
Section B -				
Actuator test				
- Check values denoted by "P"				
- Assembly warm-up time: 3 mins. at n = 600 1/min, Control-rod ca. 10 mm				
CONTROL-ROD PICKUP SETTING				
Test speed	1/min		0	
Setting value				
U/actual	V		3.100	
Control-rod travel	mm		12.95	13.05
P Control-rod travel	mm		12.90	13.10
Check value				
U/actual	V		1.700	
Control-rod travel	mm		5.90	6.40
P Control-rod travel	mm		5.85	6.45
Stop position				
U/actual	V		mind.	4)
Control-rod travel	mm		0.5	1.0
P Control-rod travel	mm		0.4	1.1

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		Min	Max

Section C -

Injection pump with actuator

- Check values denoted by "P"

FUEL DELIVERY TEST AND SETTING

	Test point V1			
	Speed	1/min	1200	
	U/actual	V	2.540	
	Prestroke magnet - Magnet stroke	mm	10.3	
	Fuel delivery	cm3/1000str	208.0	210.0
P	Fuel delivery	cm3/1000str	205.0	213.0
	Dispersion	cm3/1000str		5.0
P	Dispersion	cm3/1000str		9.0
	Test point L1			
	Speed	1/min	300	
	U/actual	V	1,380	1,500
	Prestroke magnet - Magnet stroke	mm	8.8	
	Fuel delivery	cm3/1000str	12.0	18.0
	Dispersion	cm3/1000str		8.0
P	Dispersion	cm3/1000str		12.0

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REMARKS

	Dimension "Y" (Adjustment flange)	15.6	16.1

1) = Setting of overflow volume: omitted.

2) = Start-of-ddelivery incipient fissure on FB cyl. 1. Tolerance +/- 0.10° NW.

3) = Setting of cam disk position: omitted.

4) = U/actual value min.: U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

BOSCH TEST SPECS. IP ASSEMBLY

TEST SHEET : 0 402 796 201
Edition : 11.94 (2) EN
Type number : 0 412 726 201
Type number : 0 421 890 354
CUSTOMER IDENT. NO.:

Pump: PES 6 H 120/720/3 LS 1001
Regulator: RE 33
IP-ASSEMBLY: 0 402 796 201

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Customer-specific details
Customer: MAN
Engine: D 2866 LF 14
Output kW:
at 1/min:

		Min	Max
Test PREREQUISITES			
Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 082	
Inlet pressure	bar	- -	- -
Overflow 1)	l/h	160	170
Calibrating nozzle-holder assembly		1 688 901 105	
Opening pressure	bar	207	210
Perforated plate diameter	mm	- -	
Test pressure line		1 680 750 089	
Dimensions:			
Outer diameter.	mm	8.0	
x wall thickness	mm	2.5	
x length	mm	600	
TEST SPECIFICATIONS			

Section A -
Setting values of injection pump
- Check values denoted by "P"
- No basic setting. Equal delivery setting under Section C.

PORT CLOSING

	PC setting cyl.	6	
	Test pressure	bar 30	32
	Prestroke (from BDC)	mm 9.94	10.04
P	Prestroke (from BDC)	mm 9.89	10.09
	Control-rod travel	mm 10.0	11.0
	Cam sequence	6-2-4-1-5-3	
	PC difference °CS	60 each	
	tolerance +/-°CS		0.15
P	tolerance +/-°CS		0.30

		Min	Max
	PC mark Cyl.-No.	- 2)	
	Pulse wheel position (PC cam) °CS	0 3)	
	Tolerance +/-°CS		0.10
P	Tolerance +/-°CS		- -

Section B -

Actuator test
- Check values denoted by "P"
- Assembly warm-up time: 3 mins. at n = 600 1/min Control-rod ca. 10 mm

CONTROL-ROD PICKUP SETTING

	Test speed	1/min 0	
	Setting value		
	U/actual	V 3.100	
	Control-rod travel	mm 12.95	13.05
P	Control-rod travel	mm 12.90	13.10
	Check value		
	U/actual	V 1.700	
	Control-rod travel	mm 5.90	6.40
P	Control-rod travel	mm 5.85	6.45
	Stop position		
	U/actual	V mind.	4)
	Control-rod travel	mm 0.5	1.0
P	Control-rod travel	mm 0.4	1.1

Continued on next page

		Min	Max
S e c t i o n C -			
Injection pump with actuator			
- Check values denoted by "P"			
FUEL DELIVERY TEST AND SETTING (Observe "Remarks" Point 5))			
Test point V1			
Speed	1/min	750	
U/actual	V	3.350	
Prestroke magnet -			
Magnet stroke mm		10.0	
Fuel delivery	cm3/1000str	331.0	333.0
P Fuel delivery	cm3/1000str	328.0	336.0
Dispersion	cm3/1000str		5.0
P Dispersion	cm3/1000str		9.0
Test point L1			
Speed	1/min	300	
U/actual	V	1.460	1.580
Prestroke magnet -			
Magnet stroke mm		7.2	
Fuel delivery	cm3/1000str	27.0	33.0
Dispersion	cm3/1000str		8.0
P Dispersion	cm3/1000str		12.0

Testoil-ISO 4113

REMARKS

		Min	Max
Dimension "Y" (Adjustment flange)		15.6	16.1

1) = Setting of overflow at full load (refer to measurement point V1).

2) = No start-of-delivery mark.

3) = Setting of cam disk position: omitted: on FB cyl. 6.

4) = U/actual value min.: U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

BOSCH TEST SPECS. IP ASSEMBLY

TEST SHEET : 0 402 796 806
Edition : 12.94 (3) EN
Type number : 0 412 726 855
Type number : 0 421 890 013
CUSTOMER IDENT. NO.:

Pump : PES 6 P 120 A 720 RS 7240
Regulator : RE 30
IP-ASSEMBLY: 0 402 796 806

Customer-specific details
Customer: IVECO - UNIC
Engine: 8460.41.5020
Output kW:
at 1/min:

		Min	Max
Test PREREQUISITES			
Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 025	
Inlet pressure	bar	1.5	1.6
Overflow	l/h	-	-
Calibrating nozzle-holder assembly		1 688 901 105	
Opening pressure	bar	207	210
Perforated plate diameter	mm	0.8	
Test pressure line		1 680 750 015	
Dimensions:			
Outer diameter.	mm	6.0	
x wall thickness	mm	1.5	
x length	mm	600	
TEST SPECIFICATIONS			

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Section A -
Setting values of injection pump
- Check values denoted by "P"
- No basic setting. Equal delivery setting under Section C.

PORT CLOSING

PC setting cyl.		1	
Test pressure	bar	25	27
Prestroke (from BDC)	mm	5.10	5.20
P Prestroke (from BDC)	mm	5.05	5.25
Control-rod travel	mm	9.0	12.0
Cam sequence 1 - 5 - 3 - 6 - 2 - 4			
PC difference	°CS	60 each	
tolerance +/-	°CS		0.50
P tolerance +/-	°CS		0.75

		Min	Max
PC mark	Cyl.-No.	- 2)	
Pulse wheel position (PC cam)	°CS	0 3)	
Tolerance +/-	°CS		0.20
P Tolerance +/-	°CS		0.75

Section B -

Actuator test
- Check values denoted by "P"
- Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5 V

CONTROL-ROD PICKUP SETTING

Test speed	1/min	0	
Setting value			
U/actual	V	3.100	
Control-rod travel	mm	12.95	13.05
P Control-rod travel	mm	12.90	13.10
Check value			
U/actual	V	1.700	
Control-rod travel	mm	5.90	6.40
P Control-rod travel	mm	5.85	6.45
Stop position			
U/actual	V	mind.	4)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1

SPEED SENSOR SIGNALS

- Test with control rod in stop position

Speed	1/min	60	
pos.amplitude	V	0.8	2.0
P pos.amplitude	V	0.6	3.0
Speed	1/min	600	
Difference Amplitude to Amplitude	V	max. 1.4	

Continued on next page

G1

			Min	Max
Section C -				
Injection pump with actuator				
- Check values denoted by "P"				
FUEL DELIVERY TEST AND SETTING				
Test point V1				
Speed	1/min		1050	
U/actual	V		2.900	
Fuel delivery	cm3/1000str		235.0	237.0
P Fuel delivery	cm3/1000str		232.0	240.0
Dispersion	cm3/1000str			5.0
P Dispersion	cm3/1000str			9.0
Test point L1				
Speed	1/min		275	
U/actual	V		1.520	1.640
Fuel delivery	cm3/1000str		32.0	38.0
Dispersion	cm3/1000str			8.0
P Dispersion	cm3/1000str			12.0
REMARKS				
Dimension "Y" (Adjustment flange)			15.6	16.1

2) = No start-of-delivery mark.

3) = Setting of pulse-wheel position at start of delivery of cylinder No. 1.

4) = U/actual value min.: U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

Testoil-ISO 4113

BOSCH TEST SPECS. IP ASSEMBLY

TEST SHEET: DEE
Edition: 06.93 (1) EN
Type number: 0 412 726 863
Type number: 0 421 890 014
CUSTOMER IDENT. NO.:

Pump: PES 6 P 120 A 720 RS 7259
Regulator: RE 30
IP-ASSEMBLY 0 402 796 809

Customer-specific details
Customer: JOHN DEERE
Engine: 6101 HRW 11
Output kW: 233
at 1/min: 2100

		Min	Max
Test PREREQUISITES			
Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 077	
Inlet pressure	bar	1.5	1.6
Overflow	l/h	-	-
Calibrating nozzle-holder assembly		1 688 901 103	
Opening pressure	bar	207	210
Perforated plate diameter	mm	0.7	
Test pressure line		1 680 750 015	
Dimensions:			
Outer diameter.	mm	6.0	
x wall thickness	mm	1.5	
x length	mm	600	
TEST SPECIFICATIONS			
Section A -			
Setting values of injection pump			
- Check values denoted by "P"			
- No basic setting. Equal delivery setting under Section C.			
PORT CLOSING 1)			
PC setting cyl.		1	
Test pressure	bar	25	27
Prestroke (from BDC)	mm	3.55	3.65
P Prestroke (from BDC)	mm	3.50	3.70
Control-rod travel	mm	9.00	12.0
Cam sequence 1 - 5 - 3 - 6 - 2 - 4			
PC difference °CS		60 each	
tolerance +/-°CS			0.50
P tolerance +/-°CS			0.75

		Min	Max
PC mark	Cyl.-No.	- 2)	
Pulse wheel position (PC cam)	°CS	0 3)	
Tolerance +/-°CS			0.20
P Tolerance +/-°CS			0.75
Section B -			
Actuator test			
- Check values denoted by "P"			
- Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5V			
CONTROL-ROD PICKUP SETTING			
Test speed	1/min	0	
Setting value			
U/actual	V	3.100	
Control-rod travel	mm	12.95	13.05
P Control-rod travel	mm	12.90	13.10
Check value			
U/actual	V	1.70	
Control-rod travel	mm	5.90	6.40
P Control-rod travel	mm	5.85	6.45
Stop position			
U/actual	V	mind. 4)	
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1
SPEED SENSOR SIGNALS			
- Test with control rod in stop position			
Speed	1/min	60	
pos.amplitude	V	0.8	2.0
P pos.amplitude	V	0.6	3.0
Speed	1/min	600	
Difference Amplitude to Amplitude	V	max. 1.4	

Continued on next page

G3

			Min	Max
Section C -				
Injection pump with actuator				
- Check values denoted by "P"				
FUEL DELIVERY TEST AND SETTING				
Test point V1				
Speed	1/min		1050	
U/actual	V		2.840	
Fuel delivery	cm3/1000str		212.0	214.0
P Fuel delivery	cm3/1000str		210.0	216.0
Dispersion	cm3/1000str			5.0
P Dispersion	cm3/1000str			9.0
Test point L1				
Speed	1/min		250	
U/actual	V		1.530	1.650
Fuel delivery	cm3/1000str		23.0	29.0
Dispersion	cm3/1000str			6.0
P Dispersion	cm3/1000str			10.0

REMARKS

JOHN DEERE : RE 42 302

Dimension "Y" (Adjustment flange)		15.6	16.1

2) = Flow begin-incipient fissure 8.75 degrees NW after flow begin cylinder 1.
Incipient fissure over clutch and indicator.
Incipient fissure measured at 62...68 degrees to vertical axis of pump.

3) = Setting of pulse-wheel position at flow begin

4) = U/actual value min:
U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

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BOSCH TEST SPECS. IP ASSEMBLY

TEST SHEET : 0 402 796 812
Edition : 12.94 (1) EN
Type number : 0 412 726 902
Type number : 0 421 890 017
CUSTOMER IDENT. NO.:

Pump : PES 6 P 120 A 720 RS 7315
Regulator : RE 30
IP-ASSEMBLY: 0 402 796 812

Customer-specific details
Customer: JOHN DEERE
Engine: 6081 (8400 ROW)
Output kW: 205
at 1/min:

		Min	Max
Test PREREQUISITES			
Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 077	
Inlet pressure	bar	1.4	1.6
Overflow	l/h	-	-
Calibrating nozzle-holder assembly		1 688 901 103	
Opening pressure	bar	207	210
Perforated plate diameter	mm	0.7	
Test pressure line		1 680 750 089	
Dimensions:			
Outer diameter.	mm	8.0	
x wall thickness	mm	2.5	
x length	mm	600	
TEST SPECIFICATIONS			
Section A -			
Setting values of injection pump			
- Check values denoted by "P"			
- No basic setting. Equal delivery setting under Section C.			
PORT CLOSING			
PC setting cyl.		1	
Test pressure	bar	25	27
Prestroke (from BDC)	mm	3.55	3.65
P Prestroke (from BDC)	mm	3.50	3.70
Control-rod travel	mm	10.0	11.0
Cam sequence		1 - 5 - 3 - 6 - 2 - 4	
PC difference	°CS	60 each	
tolerance +/-	°CS		0.50
P tolerance +/-	°CS		0.75

		Min	Max
PC mark Cyl.-No.		1	2)
Pulse wheel position (PC cam)	°CS	0	3)
Tolerance +/-	°CS		0.20
P Tolerance +/-	°CS		0.75
Section B -			
Actuator test			
- Check values denoted by "P"			
- Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5 V			
CONTROL-ROD PICKUP SETTING			
Test speed	1/min	0	
Setting value U/actual	V	3.100	
Control-rod travel	mm	12.95	13.05
P Control-rod travel	mm	12.90	13.10
Check value			
U/actual	V	1.700	
Control-rod travel	mm	5.90	6.40
P Control-rod travel	mm	5.85	6.45
Stop position			
U/actual	V	mind.	4)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1
SPEED SENSOR SIGNALS			
- Test with control rod in stop position			
Speed	1/min	60	
pos.amplitude	V	0.8	2.0
P pos.amplitude	V	0.6	3.0
Speed	1/min	600	
Difference Amplitude to Amplitude	V	max. 1.4	

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		Min	Max

Section C -

Injection pump with actuator

- Check values denoted by "P"

FUEL DELIVERY TEST AND SETTING

Test point V1

	Speed	1/min	1050	
	U/actual	V	2.840	
	Fuel delivery	cm3/1000str	212.0	214.0
P	Fuel delivery	cm3/1000str	209.0	217.0
	Dispersion	cm3/1000str		5.0
P	Dispersion	cm3/1000str		9.0

Test point L1

	Speed	1/min	450	
	U/actual	V	1.530	1.650
	delivery	cm3/1000str	23.0	29.0
	Dispersion	cm3/1000str		6.0
P	Dispersion	cm3/1000str		10.0

REMARKS

John Deere Nr.: RE 57 375
Dimension "Y"
(Adjustment flange) 15.6 16.1

2) = Start-of-delivery - Incipient fissure 9.75 degrees NW after start-of-delivery cyl.1 Incipient fissure over coupling and pointer. Incipient fissure measured at 67...73 degrees from vertical axis of pump.

3) = Setting of pulse-wheel position at start of delivery of cylinder No. 1.

4) = U/actual value min.: U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

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BOSCH TEST SPECS. IP ASSEMBLY

Pump : PES 6 P 120 A 720 RS 7356
Regulator : RE 30
IP-ASSEMBLY: 0 402 796 813

TEST SHEET : 0 402 796 816
Edition : 12.94 (1) EN
Type number : 0 412 726 919
Type number : 0 421 890 017
CUSTOMER IDENT. NO.:

Customer-specific details
Customer: JOHN DEERE
Engine: 6081 (8400 ROW)
Output kW: 205
at 1/min:

		Min	Max
Test PREREQUISITES			
Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 077	
Inlet pressure	bar	1.4	1.6
Overflow	l/h	-	-
Calibrating nozzle-holder assembly		1 688 901 103	
Opening pressure	bar	207	210
Perforated plate diameter	mm	0.7	
Test pressure line		1 680 750 089	
Dimensions:			
Outer diameter.	mm	8.0	
x wall thickness	mm	2.5	
x length	mm	600	
TEST SPECIFICATIONS			
Section A -			
Setting values of injection pump			
- Check values denoted by "P"			
- No basic setting. Equal delivery setting under Section C.			
PORT CLOSING			
PC setting cyl.		1	
Test pressure	bar	25	27
Prestroke (from BDC)	mm	3.55	3.65
P Prestroke (from BDC)	mm	3.50	3.70
Control-rod travel	mm	10.0	11.0
Cam sequence 1 - 5 - 3 - 6 - 2 - 4			
PC difference °CS		60 each	
tolerance +/-°CS			0.50
P tolerance +/-°CS			0.75

		Min	Max
PC mark	Cyl.-No.	1	2)
Pulse wheel position (PC cam)	°CS	0	3)
Tolerance +/-°CS			0.20
P Tolerance +/-°CS			0.75

Section B -

Actuator test
- Check values denoted by "P"
- Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5 V

CONTROL-ROD PICKUP SETTING

Test speed	1/min	0	
Setting value			
U/actual	V	3.100	
Control-rod travel	mm	12.95	13.05
P Control-rod travel	mm	12.90	13.10
Check value			
U/actual	V	1.700	
Control-rod travel	mm	5.90	6.40
P Control-rod travel	mm	5.85	6.45
Stop position			
U/actual	V	mind.	4)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1

SPEED SENSOR SIGNALS

- Test with control rod in stop position

Speed	1/min	60	
pos.amplitude	V	0.8	2.0
P pos.amplitude	V	0.6	3.0
Speed	1/min	600	
Difference Amplitude to Amplitude	V	max. 1.4	

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			Min	Max
Section C -				
Injection pump with actuator				
- Check values denoted by "P"				
FUEL DELIVERY TEST AND SETTING				
Test point V1				
Speed	1/min		1050	
U/actual	V		3.030	
Fuel delivery	cm3/1000str		212.0	214.0
P Fuel delivery	cm3/1000str		209.0	217.0
Dispersion	cm3/1000str			5.0
P Dispersion	cm3/1000str			9.0
Test point L1				
Speed	1/min		450	
U/actual	V		1.680	1.800
delivery	cm3/1000str		23.0	29.0
Dispersion	cm3/1000str			6.0
P Dispersion	cm3/1000str			10.0

REMARKS

John Deere-Nr.: RE 61 658
Dimension "Y"
(Adjustment flange) 15.6 16.1

2) = Start-of-delivery - Incipient fissure 9.75 degrees NW after start-of-delivery cyl.1 Incipient fissure over coupling and pointer. Incipient fissure measured at 67...73 degrees from vertical axis of pump.

3) = Pulse wheel position 10.5° camshaft after port closing of cylinder 1.

4) = U/actual value min.: U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

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BOSCH TEST SPECS. IP ASSEMBLY

TEST SHEET : 0 402 896 004
Edition : 12.94 (5) EN
Type number : 0 412 826 014
Type number : 0 421 890 009
CUSTOMER IDENT. NO.:

Pump : PE 6 P 120 A 720 RS 8010
Regulator : RE 30
IP-ASSEMBLY: 0 402 896 004

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Customer-specific details
Customer: SCANIA
Engine: DSC 1127 (Bus)
Output kW:
at 1/min:

		Min	Max
Test PREREQUISITES			
Test oil inlet temperature	°C	38	42
Overflow valve		1 417 413 025	
Inlet pressure	bar	2.4	2.6
Overflow	l/h	-	-
Calibrating nozzle-holder assembly		1 688 901 104	
Opening pressure	bar	250	253
Perforated plate diameter	mm	0.7	
Test pressure line		1 680 750 008	
Dimensions:			
Outer diameter.	mm	6.0	
x wall thickness	mm	2.0	
x length	mm	600	
TEST SPECIFICATIONS			
Section A -			
Setting values of injection pump			
- Check values denoted by "P"			
- No basic setting. Equal delivery setting under Section C.			
PORT CLOSING			
PC setting cyl.		1	
Test pressure	bar	25	27
Prestroke (from BDC)	mm	2.75	2.85
P Prestroke (from BDC)	mm	2.70	2.90
Control-rod travel	mm	10.0	11.0
Cam sequence 1 - 5 - 3 - 6 - 2 - 4			
PC difference	°CS	60 each	
tolerance +/-	°CS		0.50
P tolerance +/-	°CS		0.75

		Min	Max
PC mark	Cyl.-No.	1 2)	
Pulse wheel position (PC cam)	°CS	0 3)	
Tolerance +/-	°CS		0.20
P Tolerance +/-	°CS		0.75
Section B -			
Actuator test			
- Check values denoted by "P"			
- Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5 V			
CONTROL-ROD PICKUP SETTING			
Test speed	1/min	0	
Setting value U/actual	V	3.100	
Control-rod travel	mm	12.95	13.05
P Control-rod travel	mm	12.90	13.10
Check value			
U/actual	V	1.700	
Control-rod travel	mm	5.90	6.40
P Control-rod travel	mm	5.85	6.45
Stop position			
U/actual	V	mind.	4)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1
SPEED SENSOR SIGNALS			
- Test with control rod in stop position			
Speed	1/min	60	
pos.amplitude	V	0.8	2.0
P pos.amplitude	V	0.6	3.0
Speed	1/min	600	
Difference Amplitude to Amplitude	V	max. 1.4	

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Section C -

Injection pump with actuator

- Check values denoted by "P"

FUEL DELIVERY TEST AND SETTING
(Observe "Remarks" Point 5), 6)).

			Min	Max
	Test point V1			
	Speed	1/min	700	
	U/actual	V	3.500	
	Fuel delivery	cm3/1000str	331.0	333.0
P	Fuel delivery	cm3/1000str	328.0	336.0
	Dispersion	cm3/1000str		8.0
P	Dispersion	cm3/1000str		12.0
	Test point L1			
	Speed	1/min	250	
	U/actual	V	1.660	1.780
	Fuel delivery	cm3/1000str	13.0	19.0
	Dispersion	cm3/1000str		4.0
P	Dispersion	cm3/1000str		8.0

REMARKS

SCANIA-No.: 1 328 145

	Min	Max
Dimension "Y" (Adjustment flange)	15.6	16.1

1) = Arrangement of pressure-relief valve: Pump side 4.2 (previous: pump side 2 rear).

2) = Start of delivery mark at start of delivery of cylinder No 1.

3) = Setting of pulse-wheel position at start of delivery of cylinder No. 1.

4) = U/actual value min.: U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

REMARKS (Continued)

5) = Feed rate checking and adjustment with ROBO diaphragm. Connection of the ROBO diaphragm: Pump page 3.1 (previous: pump side 1).

6) = Pressure valve holder: Setting of valve spring pretensioning omitted.

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BOSCH TEST SPECS. IP ASSEMBLY

TEST SHEET : 0 402 896 013
Edition : 12.94 (1) EN
Type number : 0 412 826 026
Type number : 0 421 890 019
CUSTOMER IDENT. NO.:

Pump : PE 6 P 120 A 720 RS 8025
Regulator: RE 30
IP-ASSEMBLY: 0 402 896 013

Customer-specific details
Customer: SCANIA
Engine: DSC 1124 (BUS)
Output kW:
at 1/min:

		Min	Max
Test PREREQUISITES			
Test oil inlet temperature	°C	38	42
Overflow valve		1 417 413 025	
Inlet pressure	bar	2.4	2.6
Overflow	l/h	220	260
Calibrating nozzle-holder assembly		1 688 901 104	
Opening pressure	bar	250	253
Perforated plate diameter	mm	0.7	
Test pressure line		1 680 750 008	
Dimensions:			
Outer diameter.	mm	6.0	
x wall thickness	mm	2.0	
x length	mm	600	

Testoil-ISO 4113

TEST SPECIFICATIONS

Section A -

Setting values of injection pump
- Check values denoted by "P"
- No basic setting. Equal delivery setting under Section C.

PORT CLOSING

			Min	Max
	PC setting cyl.		1	
	Test pressure	bar	25	27
	Prestroke (from BDC)	mm	2.80	2.90
P	Prestroke (from BDC)	mm	2.75	2.95
	Control-rod travel	mm	10.0	11.0
	Cam sequence 1 - 5 - 3 - 6 - 2 - 4			
	PC difference °CS		60 each	
	tolerance +/-°CS			0.50
P	tolerance +/-°CS			0.75

			Min	Max
	PC mark	Cyl.-No.	1 3)	
	Pulse wheel position (PC cam)	°CS	0 4)	
	Tolerance +/-°CS			0.20
P	Tolerance +/-°CS			0.75

Section B -

Actuator test
- Check values denoted by "P"
- Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5V

CONTROL-ROD PICKUP SETTING

	Test speed	1/min	0	
	Setting value			
	U/actual	V	3.100	
	Control-rod travel	mm	12.95	13.05
P	Control-rod travel	mm	12.90	13.10
	Check value			
	U/actual	V	1.700	
	Control-rod travel	mm	5.90	6.40
P	Control-rod travel	mm	5.85	6.45
	Stop position			
	U/actual	V	mind.	5)
	Control-rod travel	mm	0.5	1.0
P	Control-rod travel	mm	0.4	1.1

SPEED SENSOR SIGNALS

- Test with control rod in stop position

	Speed	1/min	60	
	pos.amplitude	V	0.8	2.0
P	pos.amplitude	V	0.6	3.0
	Speed	1/min	600	
	Difference Amplitude to Amplitude	V	max. 1.4	

Continued on next page

(On our copy, revolution norm at test point I.1 is missing).

			Min	Max
S e c t i o n C -				
Injection pump with actuator				
- Check values denoted by "P"				
FUEL DELIVERY TEST AND SETTING (Observe "Remarks" Point 6), 7))				
Test point V1				
Speed	1/min	700		
U/actual	V	3.500		
Fuel delivery	cm3/1000str	339.0	341.0	
P Fuel delivery	cm3/1000str	336.0	344.0	
Dispersion	cm3/1000str		8.0	
P Dispersion	cm3/1000str		12.0	
Test point L1				
Speed	1/min	250		
U/actual	V	1,580	1,700	
Fuel delivery	cm3/1000str	13.0	19.0	
Dispersion	cm3/1000str		4.0	
P Dispersion	cm3/1000str		8.0	

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REMARKS

SCANIA-No.: 1 361 124

			Min	Max
Dimension "Y" (Adjustment flange)			15.6	16.1

1) = Arrangement of pressure-relief valve: Pump side 4.2 (previous: pump side 2 rear).

2) = Setting of overflow at full load (refer to measurement point V1).

3) = Start of delivery mark at start of delivery of cylinder No 1.

REMARKS (Continued)

4) = Setting of pulse-wheel position at start of delivery of cylinder No. 1.

5) = U/actual value min.: U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

6) = Feed rate checking and adjustment with ROBO diaphragm. Connection of the ROBO diaphragm: Pump page 3.1 (previous: pump side 1).

7) = Pressure valve holder: Setting of valve spring pretensioning omitted.

BOSCH TEST SPECS. IP ASSEMBLY

TEST SHEET : 0 402 896 014
Edition : 12.94 (1) EN
Type number : 0 412 626 028
Type number : 0 421 890 021
CUSTOMER IDENT. NO.:

Pump : PE 6 P 120 A 720 RS 8029
Regulator : RE 30
IP-ASSEMBLY: 0 402 896 014

Customer-specific details
Customer: SCANIA
Engine: DSC 1124, (BUS, NKW)
Output kW:
at 1/min:

		Min	Max
Test PREREQUISITES			
Test oil inlet temperature	°C	38	42
Overflow valve		1 417 413 025	
Inlet pressure	bar	2.4	2.6
Overflow	l/h	220	260
Calibrating nozzle-holder assembly		1 688 901 104	
Opening pressure	bar	250	253
Perforated plate diameter	mm	0.7	
Test pressure line		1 680 750 008	
Dimensions:			
Outer diameter.	mm	6.0	
x wall thickness	mm	2.0	
x length	mm	600	
TEST SPECIFICATIONS			
Section A -			
Setting values of injection pump			
- Check values denoted by "P"			
- No basic setting. Equal delivery setting under Section C.			
PORT CLOSING			
PC setting cyl.		1	
Test pressure	bar	25	27
Prestroke (from BDC)	mm	2.80	2.90
P Prestroke (from BDC)	mm	2.75	2.95
Control-rod travel	mm	10.0	11.0
Cam sequence		1-5-3-6-2-4	
PC difference	°CS	60 each	
tolerance +/-	°CS		0.50
P tolerance +/-	°CS		0.75

		Min	Max
PC mark	Cyl.-No.	1	3)
Pulse wheel position (PC cam)	°CS	0	4)
Tolerance +/-	°CS		0.20
P Tolerance +/-	°CS		0.75
Section B -			
Actuator test			
- Check values denoted by "P"			
- Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5 V			
CONTROL-ROD PICKUP SETTING			
Test speed	1/min	0	
Setting value			
U/actual	V	3.100	
Control-rod travel	mm	12.95	13.05
P Control-rod travel	mm	12.90	13.10
Check value			
U/actual	V	1.700	
Control-rod travel	mm	5.90	6.40
P Control-rod travel	mm	5.85	6.45
Stop position			
U/actual	V	mind.	5)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1
SPEED SENSOR SIGNALS			
- Test with control rod in stop position			
Speed	1/min	60	
pos.amplitude	V	0.8	2.0
P pos.amplitude	V	0.6	3.0
Speed	1/min	600	
Difference Amplitude to Amplitude	V	max. 1.4	

Continued on next page

Testoil-ISO 4113

G13

			Min	Max
S e c t i o n C -				
Injection pump with actuator				
- Check values denoted by "P"				
FUEL DELIVERY TEST AND SETTING (Observe "Remarks" Point 6), 7))				
Test point V1				
Speed	1/min		700	
U/actual	V		3.500	
Fuel delivery	cm3/1000str		339.0	341.0
P Fuel delivery	cm3/1000str		336.0	344.0
Dispersion	cm3/1000str			8.0
P Dispersion	cm3/1000str			12.0
Test point L1				
Speed	1/min		250	
U/actual	V		1.580	1.700
Fuel delivery	cm3/1000str		13.0	19.0
Dispersion	cm3/1000str			4.0
P Dispersion	cm3/1000str			8.0

REMARKS

SCANIA-No.: 1 361 124

Dimension "Y" (Adjustment flange)	15.6	16.1

1) = Arrangement of pressure-relief valve: Pump side 4.2 (previous: pump side 2 rear).

2) = Setting of overflow at full load (refer to measurement point V1).

3) = Start of delivery mark at start of delivery of cylinder No 1.

4) = Setting of pulse-wheel position at start of delivery of cylinder No. 1.

REMARKS (Continued)

5) = U/actual value min.: U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

6) = Feed rate checking and adjustment with ROBO diaphragm. Connection of the ROBO diaphragm: Pump page 3.1 (previous: pump side 2).

7) = Pressure valve holder: Setting of valve spring pretensioning omitted.

Testoil-ISO 4113

BOSCH TEST SPECS. IP ASSEMBLY

TEST SHEET : 0 402 996 302
Edition : 12.94 (1) EN
Type number : 0 412 926 204
Type number : 0 421 890 015
CUSTOMER IDENT. NO.:

Pump: PES 6 P 120 A 720 RS 8505
Regulator: RE 30
IP-ASSEMBLY: 0 402 996 302

Customer-specific details
Customer: MACK
Engine: E 7 - 450
Output kW: - -
at 1/min:

		Min	Max
Test PREREQUISITES			
Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 084	
Inlet pressure	bar	2.4	2.6
Overflow 1)	l/h	- -	- -
Calibrating nozzle-holder assembly		1 688 901 103	
Opening pressure	bar	207	210
Perforated plate diameter	mm	0.7	
Test pressure line		1 680 750 008	
Dimensions:			
Outer diameter.	mm	6.0	
x wall thickness	mm	2.0	
x length	mm	600	
TEST SPECIFICATIONS			
Section A -			
Setting values of injection pump			
- Check values denoted by "P"			
- No basic setting. Equal delivery setting under Section C.			
PORT CLOSING			
PC setting cyl.		1	
Test pressure	bar	22	24
Prestroke (from BDC)	mm	3.55	3.65
P Prestroke (from BDC)	mm	3.50	3.70
Control-rod travel	mm	11.8	12.2
Cam sequence 1 - 5 - 3 - 6 - 2 - 4			
PC difference °CS		60 each	
tolerance +/-°CS			0.30
P tolerance +/-°CS			0.75
PC mark Cyl.-No.		- 2)	
Pulse wheel position (PC cam)	°CS	0 3)	
Tolerance +/-°CS			0.20
P Tolerance +/-°CS			0.50
Section B -			
Actuator test			
- Check values denoted by "P"			
- Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5V			
CONTROL-ROD PICKUP SETTING			
Test speed	1/min	0	
Setting value			
U/actual	V	3.100	
Control-rod travel	mm	12.95	13.05
P Control-rod travel	mm	12.90	13.10
Check value			
U/actual	V	1.700	
Control-rod travel	mm	5.90	6.40
P Control-rod travel	mm	5.85	6.45
Stop position			
U/actual	V	mind.	4)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1
SPEED SENSOR SIGNALS			
- Test with control rod in stop position			
Speed	1/min	60	
pos.amplitude	V	0.8	2.0
P pos.amplitude	V	0.6	3.0
Speed	1/min	600	
Difference Amplitude to Amplitude	V	max. 1.4	

Continued on next page

Testoil-ISO 4113

G15

			Min	Max
Section C -				
Injection pump with actuator				
- Check values denoted by "P"				
FUEL DELIVERY TEST AND SETTING				
Test point V1				
Speed	1/min		900	
U/actual	V		3.280	
Fuel delivery	cm3/1000str		364.0	366.0
P Fuel delivery	cm3/1000str		361.0	369.0
Dispersion	cm3/1000str			8.0
P Dispersion	cm3/1000str			14.0
Test point L1				
Speed	1/min		325	
U/actual	V		1.240	1.360
Fuel delivery	cm3/1000str		27.0	33.0
Dispersion	cm3/1000str			6.0
P Dispersion	cm3/1000str			14.0

REMARKS

MACK-No.: 313 GC 5205-P3

Dimension "Y" (Adjustment flange)	15.6	15.9

1) = Setting of overflow volume at full load omitted

2) = No start-of-delivery mark.

3) = Setting of pulse-wheel position at start of delivery of cylinder No. 1.

4) = U/actual value min: U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

Testoil-ISO 4113

BOSCH TEST SPECS. IP ASSEMBLY

TEST SHEET : 0 402 996 303
Edition : 12.94 (1) EN
Type number : 0 412 926 205
Type number : 0 421 890 023
CUSTOMER IDENT. NO.:

Pump : PES 6 P 120 A 720 RS 8509
Regulator: RE 30
IP-ASSEMBLY 0 402 996 303

Testoil-ISO 4113

Customer-specific details
Customer: MACK
Engine: E 7 - 400
Output kW: - -
at 1/min:

		Min	Max
Test PREREQUISITES			
Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 084	
Inlet pressure	bar	2.4	2.6
Overflow 1)	l/h	- -	- -
Calibrating nozzle-holder assembly		1 688 901 103	
Opening pressure	bar	207	210
Perforated plate diameter	mm	0.7	
Test pressure line		1 680 750 008	
Dimensions:			
Outer diameter.	mm	6.0	
x wall thickness	mm	2.0	
x length	mm	600	

TEST SPECIFICATIONS

Section A -
Setting values of injection pump
- Check values denoted by "P"
- No basic setting. Equal delivery setting under Section C.

PORT CLOSING

PC setting cyl.		1	
Test pressure	bar	22	24
Prestroke (from BDC)	mm	4.55	4.65
P Prestroke (from BDC)	mm	4.50	4.70
Control-rod travel	mm	11.8	12.2
Cam sequence 1 - 5 - 3 - 6 - 2 - 4			
PC difference °CS		60 each	
tolerance +/-°CS			0.30
P tolerance +/-°CS			0.75

		Min	Max
PC mark	Cyl.-No.	- 2)	
Pulse wheel position (PC cam)	°CS	0 3)	
Tolerance +/-°CS			0.20
P Tolerance +/-°CS			0.50

Section B -

Actuator test
- Check values denoted by "P"
- Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5V

CONTROL-ROD PICKUP SETTING

Test speed	1/min	0	
Setting value			
U/actual	V	3.100	
Control-rod travel	mm	12.95	13.05
P Control-rod travel	mm	12.90	13.10
Check value			
U/actual	V	1.700	
Control-rod travel	mm	5.90	6.40
P Control-rod travel	mm	5.85	6.45
Stop position			
U/actual	V	mind.	4)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1

SPEED SENSOR SIGNALS

- Test with control rod in stop position

Speed	1/min	60	
pos.amplitude	V	0.8	2.0
P pos.amplitude	V	0.6	3.0
Speed	1/min	600	
Difference Amplitude to Amplitude	V	max. 1.4	

Continued on next page

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6/9

			Min	Max
Section C -				
Injection pump with actuator				
- Check values denoted by "P"				
FUEL DELIVERY TEST AND SETTING				
Test point V1				
Speed	1/min		900	
U/actual	V		3.050	
Fuel delivery	cm3/1000str		309.0	311.0
P Fuel delivery	cm3/1000str		306.0	314.0
Dispersion	cm3/1000str			8.0
P Dispersion	cm3/1000str			14.0
Test point L1				
Speed	1/min		325	
U/actual	V		1.250	1.370
Fuel delivery	cm3/1000str		30.0	36.0
Dispersion	cm3/1000str			6.0
P Dispersion	cm3/1000str			14.0

Testoil-ISO 4113

REMARKS

MACK-No.: 313 GC 5205-P3

Dimension "Y" (Adjustment flange)	15.6	15.9

1) = Setting of overflow volume at full load omitted

2) = No start-of-delivery mark.

3) = Setting of pulse-wheel position at start of delivery of cylinder No. 1.

4) = U/actual value min.: U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

BOSCH TEST SPECS. IP ASSEMBLY

TEST SHEET : 0 402 996 304
Edition : 12.94 (1) EN
Type number : 0 412 926 206
Type number : 0 421 890 023
CUSTOMER IDENT. NO.:

Pump : PES 6 P 120 A 720 RS 8510
Regulator : RE 30
IP-ASSEMBLY: 0 402 996 304

Customer-specific details
Customer: MACK
Engine: E 7-450
Output kW: - -
at 1/min:

Testoil-ISO 4113

		Min	Max
Test PREREQUISITES			
Test oil inlet temperature	°C	38	42
Overflow valve		2 417 413 084	
Inlet pressure	bar	2.9	3.1
Overflow 1)	l/h	- -	- -
Calibrating nozzle-holder assembly		1 688 901 103	
Opening pressure	bar	207	210
Perforated plate diameter	mm	0.7	
Test pressure line		1 680 750 008	
Dimensions:			
Outer diameter.	mm	6.0	
x wall thickness	mm	2.0	
x length	mm	600	
TEST SPECIFICATIONS			
Section A -			
Setting values of injection pump			
- Check values denoted by "P"			
- No basic setting. Equal delivery setting under Section C.			
PORT CLOSING			
PC setting cyl.		1	
Test pressure	bar	22	24
Prestroke (from BDC)	mm	3.55	3.65
P Prestroke (from BDC)	mm	3.50	3.70
Control-rod travel	mm	11.8	12.2
Cam sequence 1 - 5 - 3 - 6 - 2 - 4			
PC difference °CS		60 each	
tolerance +/-°CS			0.30
P tolerance +/-°CS			0.75

		Min	Max
PC mark Cyl.-No.		- 2)	
Pulse wheel position (PC cam)	°CS	0 3)	
Tolerance +/-°CS			0.20
P Tolerance +/-°CS			0.50

Section B -

Actuator test
- Check values denoted by "P"
- Assembly warm-up time: 3 mins. at n = 600 1/min, U/actual = 2.5V

CONTROL-ROD PICKUP SETTING

Test speed	1/min	0	
Setting value			
U/actual	V	3.100	
Control-rod travel	mm	12.95	13.05
P Control-rod travel	mm	12.90	13.10
Check value			
U/actual	V	1.700	
Control-rod travel	mm	5.90	6.40
P Control-rod travel	mm	5.85	6.45
Stop position			
U/actual	V	mind.	4)
Control-rod travel	mm	0.5	1.0
P Control-rod travel	mm	0.4	1.1

SPEED SENSOR SIGNALS

- Test with control rod in stop position

Speed	1/min	60	
pos.amplitude	V	0.8	2.0
P pos.amplitude	V	0.6	3.0
Speed	1/min	600	
Difference Amplitude to Amplitude	V	max. 1.4	

Continued on next page

			Min	Max
Section C -				
Injection pump with actuator				
- Check values denoted by "P"				
FUEL DELIVERY TEST AND SETTING				
Test point V1				
Speed	1/min		900	
U/actual	V		3.280	
Fuel delivery	cm3/1000str		364.0	366.0
P Fuel delivery	cm3/1000str		361.0	369.0
Dispersion	cm3/1000str			8.0
P Dispersion	cm3/1000str			14.0
Test point L1				
Speed	1/min		325	
U/actual	V		1.240	1.360
Fuel delivery	cm3/1000str		27.0	33.0
Dispersion	cm3/1000str			6.0
P Dispersion	cm3/1000str			14.0

REMARKS

MACK-No.: 313 GC 5205-P3

Dimension "Y" (Adjustment flange)	15.6	15.9

1) = Setting of overflow volume at full load omitted

2) = No start-of-delivery mark.

3) = Setting of pulse-wheel position at start of delivery of cylinder No. 1.

4) = U/actual value min: U/actual minimum value with deenergized servo magnet and control rod in shutoff position.

Testoil-ISO 4113

BOSCH INJECTION PUMP TEST SPECIFICATIONS

Obsereve notes in remark colum

Test sheet : VW
Date of manufacture :
Edition : 25.10.1995
Replaces :
Test oil : ISO 4113

Injection pump : VE4/10E2250R590-1

Type No. : 0 460 404 982
Customer Ident.No. :

Customer-specific details
Customer : VW

Engine : 1.9 TDI USA

Output kW :
Speed 1/min :

TEST BENCH PREREQUISITES

Inlet pressure, bar : 0.30...0.40

Calibrating nozzle-holder assembly > : 1 688 901 114

Opening pressure > bar : 207...210

Test pressure line : 1 680 750 085

Outer diameter : 6.00
x wall thickness > : 2.20
x length > mm : 350

Overflow valve : 2 467 413 018

Test line : 0 986 612 439
(fuel-delivery actuator): (KDEP 1865/10)

Test line : 0 986 611 983
(solenoid valve start of injection): (KDEP 1190)

TEST PRECONDITIONS

Test oil return temp. > °C with thermometer : 55

Test oil supply temperature > °C : 42...47

Hold-up revolutions >1/min : 1200
Feedback voltage mV : 2500

ELECTRICAL TEST

Actuator
Connections 5 and 6
Test temperature:
15°...30°C, ohms : 0.4...1.0
50°...70°C, ohms : 0.45...1.1

Connections 5 and. ground, Mohms min. : 1.0
Connections 6 and ground, Mohms min. : 1.0
Connections 3 and 5
Mohms min. : 1.0
Connections 5 and 7
Mohms min. : 1.0

High-pressure compressor sensor
Sensor coils
Connections 1 and 2
Ohms : 4.9...6.5
Connections 2 and 3
Ohms : 4.9...6.5
Connections 1 and 3
Ohms : 9.8...13.0

Connections 1 and. ground, Mohms min. : 1.0
Connections 2 and ground, Mohms min. : 1.0
Connections 3 and ground, Mohms min. : 1.0

Temperature sensor, fuel
Connentions 4 and 7
Test temperature:
15°...30°C, kohms : 1.2...4.0
50°...70°C, kohms : 0.3...1.2

Connections 4 and ground, Mohms min. : 1.0
Connections 7 and ground Mohms min. : 1.0

Solenoid valve, start of injection
Connections 1 and 2
Test temperature :
15°...30°C, ohms : 14.3...17.3
50°...70°C, ohms : 15.5...21.0

Starting stop mV : 4120...4650

Shutoff stop mV : 650...850

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Setting values of injection pump
Check values in brackets

Supply pump pressure:
Speed 1/min : 500
Checkbk. volt.
mV : 2450
Setting value, bar : 7.6...8.4

Timing device travel:
Speed 1/min : 500
Checkbk. volt
mV : 2450
Setting value, mm : 9.7...9.9

Full-load delivery :
1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt
mV : 2500
Output
temperature °C : 61
Speed 1/min : 750
Checkbk. volt
mV : 2420
Measuring
temperature °C : 57
Fuel delivery cm³/
> 1000s : 37.2...37.6
Dispersion cm³/ : 2,5
> 1000s :

Test specifications of injection pump
Check values in brackets

Supply pump pressure variations:

1st speed 1/min : 2000
Checkbk. volt
mV : 4000
Supply pump
pressure > bar : 9.9...10.9
> bar :

2st speed 1/min : 300
Checkbk. volt
mV : 2450
Supply pump
pressure > bar : 6.6...8.0
> bar :

Timing device variations:

1st speed 1/min : 500
Checkbk. volt. mV : 2450
Timing device
travel mm :
> mm : (8.8...10.8)

2nd speed 1/min : 2000
Checkbk. volt. mV : 4000
Timing device
travel mm : 11.8...12.6
> mm : (11.4...13.0)

3rd speed 1/min : 1400
Checkbk. volt. mV : 1310
Timing device
travel mm : max. 0.5
> mm : (max. 0.8)
Solenoid valve
Start of
injection, volts : 12

4.th speed 1/min : 300
Checkbk. volt. mV : 2450
Timing device
travel mm : 6.6...9.6
> mm : (6.1...10.1)

Overflow at overflow valve:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt. mV : 2500
Output
temperature °C : 51
Speed 1/min : 2000
Checkbk. volt. mV : 3890
Measuring
temperature °C : 53
Overflow : 96...150
> cm³/10s : (83...165)

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Fuel delivery variations:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt mV : 2500
Output
temperature °C : 51
Speed 1/min : 2000
Checkbk. volt mV : 4000
Meßtemperatur °C : 53
Fuel delivery cm³/ : 54.9...57.3
> 1000s : (54.3...57.9)
Dispersion cm³/ : 2.5
> 1000s. :

2nd temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 60
Speed 1/min : 1000
Checkbk. volt mV : 3210
Measuring
temperature °C : 56
Fuel delivery cm³/ : 52.8...55.2
> 1000s : (52.2...55.8)
Dispersion cm³/ : 2.5
> 1000s :

3rd temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 60
Speed 1/min : 1000
Checkbk. volt mV : 2000
Measuring
temperature °C : 56
Fuel delivery cm³/ : 23.7...25.7
> 1000s : (23.2...26.2)
Dispersion cm³/ : 2.50
> 1000s :

4th temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 500
Checkbk. volt mV : 2450
Measuring
temperature °C : 57
Fuel delivery cm³/ : 43.8...46.4
> 1000s : (43.3...46.9)
Dispersion cm³/ : 3.0
> 1000s :

Idle delivery:
1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 400
Checkbk. volt mV : 1550
Meßtemperatur °C : 57
Fuel delivery cm³/ : 7.3...11.3
> 1000s : (6.3...12.3)
Solenoid valve
Start of
injection, volts : 12
Dispersion cm³/ : 4.0
> 1000s :

Starting fuel delivery:
1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 65
Speed 1/min : 100
Checkbk. volt mV : 2310
Measuring
temperature °C : 61
Fuel delivery cm³/ : 37.0...47.0
> 1000s : (34.0...50.0)
Solenoid valve
Start of
injection, volts : 12

Stop test:
Speed 1/min : 750
Checkbk. volt mV : 3650
ELAB volts : 0
Fuel delivery cm³/ :
max. 1000s : 3.0
Start of

Shutoff solenoid:
Cut-in voltage
min.> volts : 10.0
Rated voltage,
volts : 12.0

Notes:
High-pressure compressor sensor
Testing only possible with ballast
EPS 910

Take note of test instructions
"Distributor pump for direct
injectors"!

Dimensions for mounting and setting:

Description		
K	mm	:
KF	mm	: 6,2...6,6
SVS max.	mm	:
FH	mm	:
TS		: 1 467 010 410

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G23

BOSCH INJECTION PUMP TEST SPECIFICATIONS

Obsereve notes in remark colum

Test sheet : VW
Date of manufacture :
Edition : 25.10.1995
Replaces :
Test oil : ISO 4113

Injection pump : VE4/10E2075R638

Type No. : 0 460 404 986
Customer Ident.No. :

Customer-specific details
Customer : VW

Engine : 1.9 TDI EDC

Output kW :
Speed 1/min :

TEST BENCH PREREQUISITES

Inlet pressure, bar : 0.30...0.40

Calibrating nozzle-
holder assembly > : 1 688 901 114

Opening
pressure > bar : 207...210

Test pressure line : 1 680 750 085

Outer diameter : 6.00
x wall thickness > : 2.20
x length > mm : 350

Overflow valve : 2 467 413 018

Test line : 0 986 612 439
(fuel-delivery actuator) : (KDEP 1865/10)

Test line : 0 986 611 983
(solenoid valve
start of injection) : (KDEP 1190)

TEST PRECONDITIONS

Test oil
return temp. > °C
with thermometer : 55

Test oil supply
temperature > °C : 42...47

Hold-up
revolutions >1/min : 1200
Feedback
voltage mV : 2500

ELECTRICAL TEST

Actuator
Connections 5 and 6
Test temperature:
15°...30°C, ohms : 0.4...1.0
50°...70°C, ohms : 0.45...1.1

Connections 5 and.
ground, Mohms min. : 1.0
Connections 6 and
ground, Mohms min. : 1.0
Connections 3 and 5
Mohms min. : 1.0
Connections 5 and 7
Mohms min. : 1.0

High-pressure compressor sensor
Sensor coils
Connections 1 and 2
Ohms : 4.9...6.5
Connections 2 and 3
Ohms : 4.9...6.5
Connections 1 and 3
Ohms : 9.8...13.0

Connections 1 and.
ground, Mohms min. : 1.0
Connections 2 and
ground, Mohms min. : 1.0
Connections 3 and
ground, Mohms min. : 1.0

Temperature sensor, fuel
Connentions 4 and 7
Test temperature:
15°...30°C, kohms : 1.2...4.0
50°...70°C, kohms : 0.3...1.2

Connections 4 and
ground, Mohms min. : 1.0
Connections 7 and
ground Mohms min. : 1.0

Solenoid valve, start of injection
Connections 1 and 2
Test temperature :
15°...30°C, ohms : 14.3...17.3
50°...70°C, ohms : 15.5...21.0

Starting stop mV : 4120...4650

Shutoff stop mV : 650...850

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Setting values of injection pump
Check values in brackets

Supply pump pressure:
Speed 1/min : 500
Checkbk. volt.
mV : 2560
Setting value, bar : 8.1...8.9

Timing device travel:
Speed 1/min : 500
Checkbk. volt
mV : 2560
Setting value, mm : 10.1...10.3

Full-load delivery :
1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt
mV : 2500
Output
temperature °C : 61
Speed 1/min : 750
Checkbk. volt
mV : 2480
Measuring
temperature °C : 57
Fuel delivery cm^3/
> 1000s : 34.7...35.1
Dispersion cm^3/ : 2.5
> 1000s :

Test specifications of injection pump
Check values in brackets

Supply pump pressure variations:

1st speed 1/min : 2050
Checkbk. volt
mV : 3890
Supply pump
pressure > bar : 10.5...11.5
> bar :

2st speed 1/min : 300
Checkbk. volt
mV : 2560
Supply pump
pressure > bar : 6.8...8.2
> bar :

Timing device variations:

1st speed 1/min : 500
Checkbk. volt. mV : 2560
Timing device
travel mm :
> mm : (9.2...11.2)

2nd speed 1/min : 2050
Checkbk. volt. mV : 3890
Timing device
travel mm : 11.9...12.7
> mm : (11.5...13.1)

3rd speed 1/min : 1500
Checkbk. volt. mV : 1500
Timing device
travel mm : max. 0.5
> mm : (max. 0.8)
Solenoid valve
Start of
injection, volts : 12

4.th speed 1/min : 300
Checkbk. volt. mV : 2560
Timing device
travel mm : 6.5...10.5
> mm : (5.5...11.5)

Overflow at overflow valve:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt. mV : 2500
Output
temperature °C : 51
Speed 1/min : 2050
Checkbk. volt. mV : 3890
Measuring
temperature °C : 53
Overflow : 123...205
> cm^3/10 : (109...219)

H1

H1

Fuel delivery variations:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt mV : 2500
Output
temperature °C : 51
Speed 1/min : 2050
Checkbk. volt mV : 3890
Meßtemperatur °C : 53
Fuel delivery cm³/ : 49.3...51.7
> 1000s : (48.7...52.3)
Dispersion cm³/ : 2.5
> 1000s. :

2nd temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 60
Speed 1/min : 1000
Checkbk. volt mV : 3350
Measuring
temperature °C : 56
Fuel delivery cm³/ : 53.1...55.5
> 1000s : (52.8...55.8)
Dispersion cm³/ : 2.5
> 1000s :

3rd temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 750
Checkbk. volt mV : 2480
Measuring
temperature °C : 57
Fuel delivery cm³/ :
> 1000s : (33.6...36.2)
Dispersion cm³/ : 2,50
> 1000s :

4th temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 500
Checkbk. volt mV : 2560
Measuring
temperature °C : 57
Fuel delivery cm³/ : 42.0...44.6
> 1000s : (41.3...45.3)
Dispersion cm³/ : 3,0
> 1000s :

Idle delivery:
1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 400
Checkbk. volt mV : 1800
Meßtemperatur °C : 57
Fuel delivery cm³/ : 8.7...12.7
> 1000s : (7.7...13.7)
Solenoid valve
Start of
injection, volts : 12
Dispersion cm³/ : 4.0
> 1000s :

Starting fuel delivery:
1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 65
Speed 1/min : 100
Checkbk. volt mV : 2420
Measuring
temperature °C : 61
Fuel delivery cm³/ : 35.7...45.7
> 1000s : (32.7...48.7)
Solenoid valve
Start of
injection, volts : 12

Stop test:
Speed 1/min : 1000
Checkbk. volt mV : 4000
ELAB volts : 0
Fuel delivery cm³/ :
max. 1000s : 3.0
Start of

Shutoff solenoid:
Cut-in voltage
min.> volts : 10.0
Rated voltage,
volts : 12.0

Notes:
High-pressure compressor sensor
Testing only possible with ballast
EPS 910

Take note of test instructions
"Distributor pump for direct
injectors"!

Dimensions for mounting and setting:

Description
K mm : 3.6...3.8
KF mm : 8.2...8.6
SVS max. mm :
FH mm :
TS : 1 467 010 495

H2

BOSCH INJECTION PUMP TEST SPECIFICATIONS

Obsereve notes in remark colum

Test sheet : VW
Date of manufacture :
Edition : 25.10.1995
Replaces :
Test oil : ISO 4113

Injection pump : VE4/10E2250R640

Type No. : 0 460 404 987
Customer Ident.No. :

Customer-specific details
Customer : VW

Engine : 1.9 SDI EDC

Output kW :
Speed 1/min :

TEST BENCH PREREQUISITES

Inlet pressure, bar : 0.30...0.40

Calibrating nozzle-holder assembly > : 1 688 901 114

Opening pressure > bar : 207...210

Test pressure line : 1 680 750 085

Outer diameter : 6.00
x wall thickness > : 2.20
x length > mm : 350

Overflow valve : 2 467 413 018

Test line : 0 986 612 439
(fuel-delivery actuator) : (KDEP 1865/10

Test line : 0 986 611 983
(solenoid valve start of injection) : (KDEP 1190)

TEST PRECONDITIONS

Test oil return temp. > °C with thermometer : 55

Test oil supply temperature > °C : 42...47

Hold-up revolutions >1/min : 1200
Feedback voltage mV : 2500

ELECTRICAL TEST

Actuator
Connections 5 and 6
Test temperature:
15°...30°C, ohms : 0.4...1.0
50°...70°C, ohms : 0.45...1.1

Connections 5 and. ground, Mohms min. : 1.0
Connections 6 and ground, Mohms min. : 1.0
Connections 3 and 5
Mohms min. : 1.0
Connections 5 and 7
Mohms min. : 1.0

High-pressure compressor sensor
Sensor coils
Connections 1 and 2
Ohms : 4.9...6.5
Connections 2 and 3
Ohms : 4.9...6.5
Connections 1 and 3
Ohms : 9.8...13.0

Connections 1 and. ground, Mohms min. : 1.0
Connections 2 and ground, Mohms min. : 1.0
Connections 3 and ground, Mohms min. : 1.0

Temperature sensor, fuel
Connentions 4 and 7
Test temperature:
15°...30°C, kohms : 1.2...4.0
50°...70°C, kohms : 0.3...1.2

Connections 4 and ground, Mohms min. : 1.0
Connections 7 and ground Mohms min. : 1.0

Solenoid valve, start of injection
Connections 1 and 2
Test temperature :
15°...30°C, ohms : 14.3...17.3
50°...70°C, ohms : 15.5...21.0

Starting stop mV : 4120...4650

Shutoff stop mV : 650...850

H3

13

Setting values of injection pump
Check values in brackets

Supply pump pressure:
Speed 1/min : 500
Checkbk. volt.
mV : 2360
Setting value, bar : 6.1...6.5

Timing device travel:
Speed 1/min : 500
Checkbk. volt
mV : 2360
Setting value, mm : 10.6...10.8

Full-load delivery :
1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt
mV : 2500
Output
temperature °C : 61
Speed 1/min : 800
Checkbk. volt
mV : 2550
Measuring
temperature °C : 57
Fuel delivery cm^3/
> 1000s : 34.6...35.0
Dispersion cm^3/ : 2.5
> 1000s :

Test specifications of injection pump
Check values in brackets

Supply pump pressure variations:

1st speed 1/min : 2100
Checkbk. volt
mV : 3370
Supply pump
pressure > bar : 8.7...9.3
> bar : (8.5...9.5)

2st speed 1/min : 300
Checkbk. volt
mV : 2360
Supply pump
pressure > bar : 5.4...6.6
> bar : (5.2...6.8)

Timing device variations:

1st speed 1/min : 500
Checkbk. volt. mV : 2360
Timing device
travel mm :
> mm : (9.7...11.7)

2nd speed 1/min : 2100
Checkbk. volt. mV : 3370
Timing device
travel mm : 11.8...12.4
> mm : (11.4...13.0)

3rd speed 1/min : 2100
Checkbk. volt. mV : 1400
Timing device
travel mm : max. 3.0
> mm : (max. 4.0)
Solenoid valve
Start of
injection, volts : 12

4.th speed 1/min : 300
Checkbk. volt. mV : 2360
Timing device
travel mm : 8.6...11.0
> mm : (8.2...11.4)

Overflow at overflow valve:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt. mV : 2500
Output
temperature °C : 51
Speed 1/min : 2100
Checkbk. volt. mV : 3370
Measuring
temperature °C : 53
Overflow : 109...164
> cm^3/10 : (82...193)

Fuel delivery variations:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt mV : 2500
Output
temperature °C : 51
Speed 1/min : 2100
Checkbk. volt mV : 3370
Meßtemperatur °C : 53
Fuel delivery cm^3/ : 36.4...38.8
> 1000s : (35.8...39.4)
Dispersion cm^3/ : 2.5
> 1000s. :

H4

H4

2nd temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 60
Speed 1/min : 1100
Checkbk. volt mV : 2770
Measuring
temperature °C : 56
Fuel delivery cm³/ : 34.4...36.8
> 1000s : (33.8...37.4)
Dispersion cm³/ : 2.5
> 1000s :

3rd temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 60
Speed 1/min : 1100
Checkbk. volt mV : 2160
Measuring
temperature °C : 56
Fuel delivery cm³/ : 23.5...25.5
> 1000s : (23.0...26.0)
Dispersion cm³/ : 2.50
> 1000s :

4th temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 800
Checkbk. volt mV : 2550
Measuring
temperature °C : 57
Fuel delivery cm³/ :
> 1000s : (33.5...36.1)
Dispersion cm³/ : 2.5
> 1000s :

5th temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 500
Checkbk. volt mV : 2360
Measuring
temperature °C : 57
Fuel delivery cm³/ : 35.7...38.3
> 1000s : (35.2...38.8)
Dispersion cm³/ : 3.0
> 1000s :

Idle delivery:
1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 400
Checkbk. volt mV : 1640
Meßtemperatur °C : 57
Fuel delivery cm³/ : 6.0...10.0
> 1000s : (5.0...11.0)
Solenoid valve
Start of
injection, volts : 12
Dispersion cm³/ : 4.0
> 1000s :

Starting fuel delivery:
1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 65
Speed 1/min : 100
Checkbk. volt mV : 2730
Measuring
temperature °C : 61
Fuel delivery cm³/ : 43.0...53.0
> 1000s : (40.0...51.0)
Solenoid valve
Start of
injection, volts : 12

Stop test:
Speed 1/min : 750
Checkbk. volt mV : 3650
ELAB volts : 0
Fuel delivery cm³/ :
max. 1000s : 3.0
Start of

Shutoff solenoid:
Cut-in voltage
min.> volts : 10.0
Rated voltage,
volts : 12.0

Notes:
High-pressure compressor sensor
Testing only possible with ballast
EPS 910

Take note of test instructions
"Distributor pump for direct
injectors"!

Dimensions for mounting and setting:

Description
K mm :
KF mm : 6.2...6.6
SVS max. mm :
FH mm :
TS : 1 467 010 410

H5

115

BOSCH INJECTION PUMP TEST SPECIFICATIONS

Obsereve notes in remark colum

Test sheet : VW
Date of manufacture :
Edition : 25.10.1995
Replaces :
Test oil : ISO 4113

Injection pump : VE4/10E2250R600

Type No. : 0 460 404 989
Customer Ident.No. :

Customer-specific details
Customer : VW

Engine : 1.9 SDI EDC

Output kW :
Speed 1/min :

TEST BENCH PREREQUISITES

Inlet pressure, bar : 0,30...0,40

Calibrating nozzle-
holder assembly > : 1 688 901 114

Opening
pressure > bar : 207...210

Test pressure line : 1 680 750 085

Outer diameter : 6.00
x wall thickness > : 2.20
x length > mm : 350

Overflow valve : 2 467 413 018

Test line : 0 986 612 439
(fuel-delivery
actuator) : (KDEP 1865/10)

Test line : 0 986 611 983
(solenoid valve
start of injection): (KDEP 1190)

TEST PRECONDITIONS

Test oil
return temp. > °C
with thermometer : 55

Test oil supply
temperature > °C : 42...47

Hold-up
revolutions >1/min : 1200
Feedback
voltage mV : 2500

ELECTRICAL TEST

Actuator
Connections 5 and 6
Test temperature:
15°...30°C, ohms : 0.4...1.0
50°...70°C, ohms : 0.45...1.1

Connections 5 and.
ground, Mohms min. : 1.0
Connections 6 and
ground, Mohms min. : 1.0
Connections 3 and 5
Mohms min. : 1.0
Connections 5 and 7
Mohms min. : 1.0

High-pressure compressor sensor
Sensor coils
Connections 1 and 2
Ohms : 4.9...6.5
Connections 2 and 3
Ohms : 4.9...6.5
Connections 1 and 3
Ohms : 9.8...13.0

Connections 1 and.
ground, Mohms min. : 1.0
Connections 2 and
ground, Mohms min. : 1.0
Connections 3 and
ground, Mohms min. : 1.0

Temperature sensor, fuel
Connentions 4 and 7
Test temperature:
15°...30°C, kohms : 1.2...4.0
50°...70°C, kohms : 0.3...1.2

Connections 4 and
grcund, Mohms min. : 1.0
Connections 7 and
ground Mohms min. : 1.0

Solenoid valve, start of injection
Connections 1 and 2
Test temperature :
15°...30°C, ohms : 14.3...17.3
50°...70°C, ohms : 15.5...21.0

Starting stop mV : 4120...4650

Shutoff stop mV : 650...850

H6

H6

Setting values of injection pump
Check values in brackets

Supply pump pressure:

Speed	1/min	: 500
Checkbk. volt. mV		: 2360
Setting value, bar		: 6.2...6.6

Timing device travel:

Speed	1/min	: 500
Checkbk. volt mV		: 2360
Setting value, mm		: 10.6...10.8

Full-load delivery :

1st temperature-conditioning revolution	1/min	: 2000
Checkbk. volt mV		: 2500
Output temperature °C		: 61
Speed	1/min	: 800
Checkbk. volt mV		: 2550
Measuring temperature °C		: 57
Fuel delivery	cm³/1000s	: 34.6...35.0
Dispersion >	cm³/1000s	: 2.5 :

Test specifications of injection pump
Check values in brackets

Supply pump pressure variations:

1st speed	1/min	: 2100
Checkbk. volt mV		: 3370
Supply pump pressure >	bar	: 8.7...9.3
>	bar	: (8.5...9.5)
2st speed	1/min	: 300
Checkbk. volt mV		: 2360
Supply pump pressure >	bar	: 5.4...6.6
>	bar	: (5.2...6.8)

Timing device variations:

1st speed	1/min	: 500
Checkbk. volt. mV		: 2360
Timing device travel	mm	:
>	mm	: (9.7...11.7)
2nd speed	1/min	: 2100
Checkbk. volt. mV		: 3370
Timing device travel	mm	: 11.8...12.4
>	mm	: (11.4...13.0)
3rd speed	1/min	: 2100
Checkbk. volt. mV		: 1400
Timing device travel	mm	: max. 3.0
>	mm	: (max. 4.0)
Solenoid valve Start of injection, volts		: 12
4.th speed	1/min	: 300
Checkbk. volt. mV		: 2360
Timing device travel	mm	: 8.6...11.0
>	mm	: (8.2...11.4)

Overflow at overflow valve:

1st temperature-conditioning revolution	1/min	: 100
Checkbk. volt. mV		: 2500
Output temperature °C		: 51
Speed	1/min	: 2100
Checkbk. volt. mV		: 3370
Measuring temperature °C		: 53
Overflow		: 96...150
>	cm³/10	: (82...164)

Fuel delivery variations:

1st temperature-conditioning revolution	1/min	: 100
Checkbk. volt mV		: 2500
Output temperature	°C	: 51
Speed	1/min	: 2100
Checkbk. volt mV		: 3370
Meßtemperatur °C		: 53
Fuel delivery	cm³/1000s	: 36.4...38.7
>		: (35.7...39.3)
Dispersion >	cm³/1000s.	: 2.5 :

H7

H7

2nd temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 60
Speed 1/min : 1100
Checkbk. volt mV : 2770
Measuring
temperature °C : 56
Fuel delivery cm³/ : 34.6...37.0
> 1000s : (34.0...37.6)
Dispersion cm³/ : 2.5
> 1000s :

3rd temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 60
Speed 1/min : 1100
Checkbk. volt mV : 2160
Measuring
temperature °C : 56
Fuel delivery cm³/ : 23.5...25.5
> 1000s : (23.0...26.0)
Dispersion cm³/ : 2.50
> 1000s :

4th temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 800
Checkbk. volt mV : 2550
Measuring
temperature °C : 57
Fuel delivery cm³/ :
> 1000s : (33.5...36.1)
Dispersion cm³/ : 2.5
> 1000s :

5th temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 500
Checkbk. volt mV : 2360
Measuring
temperature °C : 57
Fuel delivery cm³/ : 35.7...38.3
> 1000s : (35.2...38.8)
Dispersion cm³/ : 3.0
> 1000s :

Idle delivery:
1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 400
Checkbk. volt mV : 1640
Meßtemperatur °C : 57
Fuel delivery cm³/ : 6.5...10.5
> 1000s : (5.5...11.5)
Solenoid valve
Start of
injection, volts : 12
Dispersion cm³/ : 4.0
> 1000s :

Starting fuel delivery:
1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 65
Speed 1/min : 100
Checkbk. volt mV : 2730
Measuring
temperature °C : 61
Fuel delivery cm³/ : 45.0...55.0
> 1000s : (42.0...58.0)
Solenoid valve
Start of
injection, volts : 12

Stop test:
Speed 1/min : 750
Checkbk. volt mV : 3650
ELAB volts : 0
Fuel delivery cm³/ :
max. 1000s : 3.0
Start of

Shutoff solenoid:
Cut-in voltage
min.> volts : 10.0
Rated voltage,
volts : 12.0

Notes:
High-pressure compressor sensor
Testing only possible with ballast
EPS 910

Take note of test instructions
"Distributor pump for direct
injectors"!

Dimensions for mounting and setting:

Description
K mm :
KF mm :
SVS max. mm :
FH mm :

BOSCH INJECTION PUMP TEST SPECIFICATIONS

Obsereve notes in remark colum

Test sheet	: VW
Date of manufacture	:
Edition	: 25.10.1995
Replaces	:
Test oil	: ISO 4113
Injection pump	: VE4/11E2250R590
Type No.	: 0 460 404 990
Customer Ident.No.	:

Customer-specific details

Customer	: VW
Engine	: 1.9 TDI USA
Output kW	:
Speed 1/min	:

TEST BENCH PREREQUISITES

Inlet pressure, bar	: 0,30...0,40
Calibrating nozzle-holder assembly >	: 1 688 901 114
Opening pressure > bar	: 207...210
Test pressure line	: 1 680 750 085
Outer diameter	: 6,00
x wall thickness >	: 2,20
x length > mm	: 350
Overflow valve	: 2 467 413 018
Test line	: 0 986 612 439
(fuel-delivery actuator)	: KDEP 1865/10
Test line	: 0 986 611 983
(solenoid valve start of injection)	: KDEP 1190

TEST PRECONDITIONS

Test oil return temp. > °C with thermometer	: 55
Test oil supply temperature > °C	: 42...47
Hold-up revolutions >1/min	: 1200
Feedback voltage mV	: 2500

ELECTRICAL TEST

Actuator
Connections 5 and 6
Test temperature:

15°...30°C, ohms	: 0,4...1,0
50°...70°C, ohms	: 0,45...1,1
Connections 5 and. ground, Mohms min.	: 1,0
Connections 6 and ground, Mohms min.	: 1,0
Connections 3 and 5 Mohms min.	: 1,0
Connections 5 and 7 Mohms min.	: 1,0

High-pressure compressor sensor
Sensor coils

Connections 3 and 2 Ohms	: 4,9...6,5
Connections 1 and 2 Ohms	: 4,9...6,5
Connections 1 and 3 Ohms	: 9,8...13,0
Connections 1 and. ground, Mohms min.	: 1,0
Connections 2 and ground, Mohms min.	: 1,0
Connections 3 and ground, Mohms min.	: 1,0

Temperature sensor, fuel
Connentions 4 and 7
Test temperature:

15°...30°C, kohms	: 1,2...4,0
50°...70°C, kohms	: 0,3...1,2
Connections 4 and ground, Mohms min.	: 1,0
Connections 7 and ground Mohms min.	: 1,0

Solenoid valve, start of injection
Connections 1 and 2
Test temperature :

15°...30°C, ohms	: 14,3...17,3
50°...70°C, ohms	: 15,5...21,0
Starting stop mV	: 4120...4650
Shutoff stop mV	: 650...850

H9

H9

Setting values of injection pump
Check values in brackets

Supply pump pressure:
Speed 1/min : 500
Checkbk. volt.
mV : 2450
Setting value, bar : 7,8...8,2

Timing device travel:
Speed 1/min : 500
Checkbk. volt
mV : 2450
Setting value, mm : 9,7...9,9

Full-load delivery :
1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt
mV : 2500
Output
temperature °C : 61
Speed 1/min : 750
Checkbk. volt
mV : 2420
Measuring
temperature °C : 57
Fuel delivery cm³/
> 1000s : 37,2...37,6
Dispersion cm³/ : 2,5
> 1000s :

Test specifications of injection pump
Check values in brackets

Supply pump pressure variations:

1st speed 1/min : 200
Checkbk. volt
mV : 4000
Supply pump
pressure > bar : 9,9...10,5
> bar : (9,7...10,7)

2st speed 1/min : 300
Checkbk. volt
mV : 2450
Supply pump
pressure > bar : 6,7...7,9
> bar : (6,6...8,0)

Timing device variations:

1st speed 1/min : 500
Checkbk. volt. mV : 2450
Timing device
travel mm :
> mm : (8,8...10,8)

2nd speed 1/min : 2000
Checkbk. volt. mV : 4000
Timing device
travel mm : 11,8...12,6
> mm : (11,4...13,0)

3rd speed 1/min : 2100
Checkbk. volt. mV : 1310
Timing device
travel mm : max. 0,5
> mm : (max. 1,5)
Solenoid valve
Start of
injection, volts : 12

4.th speed 1/min : 300
Checkbk. volt. mV : 2450
Timing device
travel mm : 6,9...9,3
> mm : (6,5...9,7)

Overflow at overflow valve:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt. mV : 2500
Output
temperature °C : 51
Speed 1/min : 2000
Checkbk. volt. mV : 4000
Measuring
temperature °C : 53
Overflow : 109...164
> cm³/10 : (96...178)

Fuel delivery variations:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt mV : 2500
Output
temperature °C : 51
Speed 1/min : 2000
Checkbk. volt mV : 4000
Meßtemperatur °C : 53
Fuel delivery cm³/ : 55,2...57,6
> 1000s : (54,6...58,2)
Dispersion cm³/ : 2,5
> 1000s. :

H10

1110

2nd temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 60
Speed 1/min : 1000
Checkbk. volt mV : 3210
Measuring
temperature °C : 56
Fuel delivery cm³/ : 52,8...55,2
> 1000s : (52,2...55,8)
Dispersion cm³/ : 2,5
> 1000s :

3rd temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 60
Speed 1/min : 1100
Checkbk. volt mV : 2000
Measuring
temperature °C : 56
Fuel delivery cm³/ : 24,0...26,0
> 1000s : (23,5...26,5)
Dispersion cm³/ : 2,5
> 1000s :

4th temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 750
Checkbk. volt mV : 2420
Measuring
temperature °C : 57
Fuel delivery cm³/ :
> 1000s : (36,1...38,7)
Dispersion cm³/ : 2,5
> 1000s :

5th temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 500
Checkbk. volt mV : 2450
Measuring
temperature °C : 57
Fuel delivery cm³/ : 43,8...46,4
> 1000s : (43,3...46,9)
Dispersion cm³/ : 3,0
> 1000s :

Idle delivery:
1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 400
Checkbk. volt mV : 1550
Meßtemperatur °C : 57
Fuel delivery cm³/ : 8,2...12,2
> 1000s : (7,2...13,2)
Solenoid valve
Start of
injection, volts : 12
Dispersion cm³/ : 4,0
> 1000s :

Starting fuel delivery:
1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 65
Speed 1/min : 100
Checkbk. volt mV : 2310
Measuring
temperature °C : 61
Fuel delivery cm³/ : 37,0...47,0
> 1000s : (34,0...50,0)
Solenoid valve
Start of
injection, volts : 12

Stop test:
Speed 1/min : 750
Checkbk. volt mV : 3300
ELAB volts : 0
Fuel delivery cm³/ :
max. 1000s : 3,0
Start of

Shutoff solenoid:
Cut-in voltage
min.> volts : 10,0
Rated voltage,
volts : 12,0

Notes:
High-pressure compressor sensor
Testing only possible with ballast
EPS 910

Take note of test instructions
"Distributor pump for direct
injectors"!

Dimensions for mounting and setting:

Description		
K	mm	:
KF	mm	: 6.2...6.6
SVS max.	mm	:
FH	mm	:
TS		: 1 467 010 410

BOSCH INJECTION PUMP TEST SPECIFICATIONS

Obsereve notes in remark colum

Test sheet	:	PSA
Date of manufacture	:	
Edition	:	26.10.1995
Replaces	:	
Test oil	:	ISO 4113
Injection pump	:	VE4/10E2150R520
Type No.	:	0 460 404 993
Customer Ident.No.	:	

Customer-specific details

Customer	:	PSA
Engine	:	DK5ATE
Output kW	:	
Speed 1/min	:	

TEST BENCH PREREQUISITES

Inlet pressure, bar	:	0.30...0.40
Calibrating nozzle-holder assembly >	:	1 688 901 022
Opening pressure > bar	:	130...133
Test pressure line	:	1 680 750 073
Outer diameter	:	6.00
x wall thickness >	:	2.00
x length > mm	:	450
Overflow valve	:	2 467 413 009
Test line (fuel-delivery actuator)	:	0 986 612 441 (KDEP 1865/12)
Test line (solenoid valve start of injection)	:	0 986 612 435 (KDEP 1865/6)

ELECTRICAL TEST

Actuator
Connections 5 and 6
Test temperature:

15°...30°C, ohms	:	0.4...1.0
50°...70°C, ohms	:	0.45...1.1
Connections 5 and. ground, Mohms min.	:	1.0
Connections 6 and ground, Mohms min.	:	1.0
Connections 2 and 6 Mohms min.	:	1.0
Connections 4 and 5 Mohms min.	:	1.0

High-pressure compressor sensor
Sensor coils
Connections 1 and 2

Ohms	:	4.9...6.5
Connections 2 and 3 Ohms	:	4.9...6.5
Connections 1 and 3 Ohms	:	9.8...13.0
Connections 1 and. ground, Mohms min.	:	1.0
Connections 2 and ground, Mohms min.	:	1.0
Connections 3 and ground, Mohms min.	:	1.0

Temperature sensor, fuel
Connentions 4 and 7
Test temperature:

15°...30°C, kohms	:	1.2...4.0
50°...70°C, kohms	:	0.3...1.2
Connections 4 and ground, Mohms min.	:	1.0
Connections 7 and ground Mohms min.	:	1.0

Solenoid valve, start of injection
Connections 1 and 2
Test temperature :

15°...30°C, ohms	:	14.3...17.3
50°...70°C, ohms	:	15.5...21.0
Starting stop mV	:	4120...4650
Shutoff stop mV	:	650...850

H12

H12

Setting values of injection pump
Check values in brackets

Supply pump pressure:

Speed	1/min	: 1000
Checkbk. volt. mV		: 2150
Setting value, bar		: 9.4...10.4

Timing device travel:

Speed	1/min	: 1000
Checkbk. volt mV		: 3020
Setting value, mm		: 10.7...10.9
Speed	1/min	: 1250
Checkbk. volt mV		: 2230
Fuel delivery >	cm³/1000s	: 32.4...32.8
Dispersion >	cm³/1000s	: 2.0

Test specifications of injection pump
Check values in brackets

Supply pump pressure variations:

1st speed	1/min	: 2150
Checkbk. volt mV		: 3020
Supply pump pressure >	bar	: 9.4...10.4
>	bar	:

Timing device variations:

1st speed	1/min	: 500
Checkbk. volt. mV		: 3020
Timing device travel	mm	: 9.1...10.1
>	mm	: (8.4...10.8)
2nd speed	1/min	: 1000
Checkbk. volt. mV		: 3020
Timing device travel	mm	:
>	mm	: (10.0...11.6)
3rd speed	1/min	: 1600
Checkbk. volt. mV		: 1600
Timing device travel	mm	: 0.0...1.0
>	mm	: (0.0...2.5)
Solenoid valve Start of injection,	volts	: 12
4.th speed	1/min	: 2150
Checkbk. volt. mV		: 3020
Timing device travel	mm	: 12.0...12.6
>	mm	: (11.8...12.8)

Overflow at overflow valve:

Speed	1/min	: 2400
Checkbk. volt. mV		: 3020
Overflow		: 96...178
>	cm³/10s	:

Fuel delivery variations:

Speed	1/min	: 2150
Checkbk. volt	mV	: 3120
Fuel delivery	cm³/	: 70.5...73.5
>	1000s	: (69.7...74.3)
Dispersion	cm³/	: 2.0
>	1000s.	:

Speed	1/min	: 1250
Checkbk. volt	mV	: 2230
Fuel delivery	cm³/	:
>	1000s	: (31.3...33.9)
Dispersion	cm³/	:
>	1000s	:

Speed	1/min	: 1000
Checkbk. volt	mV	: 3275
Fuel delivery	cm³/	: 90.5...93.5
>	1000s	: (89.5...94.5)
Dispersion	cm³/	: 2.0
>	1000s	:

Idle delivery:

Speed	1/min	: 375
Checkbk. volt	mV	: 2175
Fuel delivery	cm³/	: 19.7...22.7
>	1000s	: (18.7...23.7)
Solenoid valve		
Start of		
injection, volts		: 12
Dispersion	cm³/	: 2.0
>	1000s	:

Starting fuel delivery:

Speed	1/min	: 100
Checkbk. volt	mV	: 3410
Fuel delivery	cm³/	: 72.0...82.0
>	1000s	: (69.0...85.0)
Solenoid valve		
Start of		
injection, volts		: 12

Stop test:

Speed	1/min	: 1000
Checkbk. volt	mV	: 3020
ELAB	volts	: 0
Fuel delivery	cm³/	:
max.	1000s	: 3.0
Dispersion	cm³/	: 5.0

Shutoff solenoid:

Cut-in voltage		
min.> volts		: 10.0
Rated voltage,		
	volts	: 12.0

Dimensions for mounting and setting:

Description		
K	mm	: 3.6...3.8
KF	mm	: 8.2...8.6
SVS max.	mm	:
FH	mm	:
TS		: 1 467 010 495

H14

BOSCH INJECTION PUMP TEST SPECIFICATIONS

Obsereve notes in remark colum

Test sheet : Audi
Date of manufacture :
Edition : 25.10.1995
Replaces :
Test oil : ISO 4113

Injection pump : VE5/11E2300L460-2

Type No. : 0 460 415 989
Customer Ident.No. :

Customer-specific details
Customer : VW

Engine : R5 2.5 L TDi

Output kW :
Speed 1/min :

TEST BENCH PREREQUISITES

Inlet pressure, bar : 0,30...0,40

Calibrating nozzle-
holder assembly > : 1 688 901 114

Opening
pressure > bar : 207...210

Test pressure line : 1 680 750 085

Outer diameter : 6.00
x wall thickness > : 2.20
x length > mm : 350

Overflow valve : 2 467 413 018

Test line : 0 986 612 440
(fuel-delivery actuator): (KDEP 1865/10)

Test line : 0 986 612 435
Solenoid valve
start of injection): (KDEP 1865/6)

TEST PRECONDITIONS

Test oil
return temp. > °C
with thermometer : 55

Test oil supply
temperature > °C : 42...47

Hold-up
revolutions >1/min : 1200
Feedback
voltage mV : 2500

ELECTRICAL TEST

Actuator
Connections 4 and 7
Test temperature:
15°...30°C, ohms : 0.4...1.0
50°...70°C, ohms : 0.45...1.1

Connections 5 and.
ground, Mohms min. : 1.0
Connections 6 and
ground, Mohms min. : 1.0
Connections 3 and 5
Mohms min. : 1.0
Connections 5 and 7
Mohms min. : 1.0

High-pressure compressor sensor
Sensor coils
Connections 2 and 3
Ohms : 4.9...6.5
Connections 1 and 3
Ohms : 4.9...6.5
Connections 1 and 2
Ohms : 9.8...13.0

Connections 1 and.
ground, Mohms min. : 1.0
Connections 2 and
ground, Mohms min. : 1.0
Connections 3 and
ground, Mohms min. : 1.0

Temperature sensor, fuel
Connentions 5 and 6
Test temperature:
15°...30°C, kohms : 1.2...4.0
50°...70°C, kohms : 0.3...1.2

Connections 5 and
ground, Mohms min. : 1.0
Connections 6 and
ground Mohms min. : 1.0

Solenoid valve, start of injection
Connections 1 and 2
Test temperature :
15°...30°C, ohms : 14.3...17.3
50°...70°C, ohms : 15.5...21.0

Starting stop mV : 4120...4650

Shutoff stop mV : 650...850

H15

H15

Setting values of injection pump
Check values in brackets

Supply pump pressure:
Speed 1/min : 750
Checkbk. volt.
mV : 3900
Setting value, bar : 6.0...7.0

Timing device travel:
Speed 1/min : 750
Checkbk. volt
mV : 3900
Setting value, mm : 9.3...9.5

Full-load delivery :
1st temperature-conditioning
revolution 1/min : 2125
Checkbk. volt
mV : 2500
Output
temperature °C : 61
Speed 1/min : 750
Checkbk. volt
mV : 2460
Measuring
temperature °C : 57
Fuel delivery cm³/
> 1000s : 40.8...41.2
Dispersion cm³/ : 2.5
> 1000s :

Test specifications of injection pump
Check values in brackets

Supply pump pressure variations:

1st speed 1/min : 2125
Checkbk. volt
mV : 3900
Supply pump
pressure > bar : 7.9...8.9
> bar :

Timing device variations:

1st speed 1/min : 500
Checkbk. volt. mV : 3900
Timing device
travel mm : 7.5...9.9
> mm : (7.2...10.2)

2nd speed 1/min : 750
Checkbk. volt. mV : 3900
Timing device
travel mm :
> mm : (7.5...11.3)

3rd speed 1/min : 1200
Checkbk. volt. mV : 1800
Timing device
travel mm : max. 0.3
> mm : (max. 1.0)
Solenoid valve
Start of
injection, volts : 12

4.th speed 1/min : 2125
Checkbk. volt. mV : 3900
Timing device
travel mm : 11.6...12.6
> mm : (11.5...12.7)

Overflow at overflow valve:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt. mV : 2500
Output
temperature °C : 51
Speed 1/min : 2125
Checkbk. volt. mV : 3900
Measuring
temperature °C : 53
Overflow : 54...164
> cm³/10s :

H16

Fuel delivery variations:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt mV : 2500
Output
temperature °C : 51
Speed 1/min : 2125
Checkbk. volt mV : 3910
Meßtemperatur °C : 53
Fuel delivery cm³/ : 55.9...58.5
> 1000s : (55.2...59.2)
Dispersion cm³/ : 3.0
> 1000s. :

2nd temperature-conditioning
revolution 1/min : 2125
Checkbk. volt mV : 2500
Output
temperature °C : 60
Speed 1/min : 1000
Checkbk. volt mV : 3210
Measuring
temperature °C : 56
Fuel delivery cm³/ : 57.2...59.8
> 1000s : (56.5...60.5)
Dispersion cm³/ : 2.0
> 1000s : (2.5)

3rd temperature-conditioning
revolution 1/min : 2125
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 750
Checkbk. volt mV : 2460
Measuring
temperature °C : 57
Fuel delivery cm³/ :
> 1000s : (39.7...42.3)
Dispersion cm³/ :
> 1000s :

4th temperature-conditioning
revolution 1/min : 2125
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 500
Checkbk. volt mV : 2320
Measuring
temperature °C : 57
Fuel delivery cm³/ : 42.1...44.7
> 1000s : (41.4...45.4)
Dispersion cm³/ : 3.0
> 1000s :

Idle delivery:

1st temperature-conditioning
revolution 1/min : 2125
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 500
Checkbk. volt mV : 1520
Meßtemperatur °C : 57
Fuel delivery cm³/ : 10.2...13.5
> 1000s : (9.2...15.2)
Solenoid valve
Start of
injection, volts : 12
Dispersion cm³/ : 3.0
> 1000s : (4.0)

Starting fuel delivery:

1st temperature-conditioning
revolution 1/min : 2125
Checkbk. volt mV : 2500
Output
temperature °C : 65
Speed 1/min : 100
Checkbk. volt mV : 2960
Measuring
temperature °C : 61
Fuel delivery cm³/ : 77.5...89.5
> 1000s : (72.5...84.5)
Solenoid valve
Start of
injection, volts : 12

Stop test:

Speed 1/min : 1500
Checkbk. volt mV : 4125
ELAB volts : 0
Fuel delivery cm³/ :
max. 1000s : 3.0
Start of
injection, volts : 12
Speed 1/min : 750
Checkbk. volt mV : 2460
ELAB volts : 0
Fuel delivery cm³/ :
max. 1000s : 5.0

Shutoff solenoid:
Cut-in voltage
min.> volts : 10.0
Rated voltage,
volts : 12.0

H17

H17

Notes:
High-pressure compressor sensor
Testing only possible with ballast
EPS 910

Take note of test instructions
"Distributor pump for direct
injectors"!

Dimensions for mounting and setting:

Description		
K	mm	: 2.7...2.9
KF	mm	: 6.5...6.9
SVS max.	mm	:
FH	mm	:
TS		: 1 467 010 494

BOSCH INJECTION PUMP TEST SPECIFICATIONS

Obsereve notes in remark colum

Test sheet	: Volvo
Date of manufacture	:
Edition	: 25.10.1995
Replaces	:
Test oil	: ISO 4113
Injection pump	: VE5/11E2300L649
Type No.	: 0 460 415 990
Customer Ident.No.	:

Customer-specific details

Customer	: Audi
Engine	: 2.5 TDI USA
Output kW	:
Speed 1/min	:

TEST BENCH PREREQUISITES

Inlet pressure, bar	: 0.30...0.40
Calibrating nozzle-holder assembly >	: 1 688 901 114
Opening pressure > bar	: 207...210
Test pressure line	: 1 680 750 085
Outer diameter	: 6.00
x wall thickness >	: 2.20
x length > mm	: 350
Overflow valve	: 2 467 413 018
Test line (fuel-delivery actuator)	: 0 986 612 439 (KDEP 1865/10)
Test line (solenoid valve start of injection)	: 0 986 611 983 (KDEP 1190)

TEST PRECONDITIONS

Test oil return temp. > °C with thermometer	: 55
Test oil supply temperature > °C	: 42...47
Hold-up revolutions >1/min	: 1200
Feedback voltage mV	: 2500

ELECTRICAL TEST

Actuator
Connections 5 and 6
Test temperature:

15°...30°C, ohms	: 0.4...1.0
50°...70°C, ohms	: 0.5...1.1
Connections 5 and. ground, Mohms min.	: 1.0
Connections 6 and ground, Mohms min.	: 1.0
Connections 3 and 5 Mohms min.	: 1.0
Connections 6 and 7 Mohms min.	: 1.0

High-pressure compressor sensor
Sensor coils
Connections 1 and 2

Ohms	: 4.9...6.5
Connections 2 and 3 Ohms	: 4.9...6.5
Connections 1 and 3 Ohms	: 9.8...13.0
Connections 1 and. ground, Mohms min.	: 1.0
Connections 2 and ground, Mohms min.	: 1.0
Connections 3 and ground, Mohms min.	: 1.0

Temperature sensor, fuel
Connentions 4 and 7
Test temperature:

15°...30°C, kohms	: 1.2...4.0
50°...70°C, kohms	: 0.3...1,2
Connections 4 and ground, Mohms min.	: 1.0
Connections 7 and ground Mohms min.	: 1.0

Solenoid valve, start of injection
Connections 1 and 2
Test temperature :

15°...30°C, ohms	: 14.3...17.3
50°...70°C, ohms	: 15.5...21.0
Starting stop mV	: 4120...4650
Shutoff stop mV	: 650...850

H19

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Setting values of injection pump
Check values in brackets

Supply pump pressure:
Speed 1/min : 750
Checkbk. volt.
mV : 3900
Setting value, bar : 6.0...7.0

Timing device travel:
Speed 1/min : 750
Checkbk. volt
mV : 3900
Setting value, mm : 9.3...9.5

Full-load delivery :
1st temperature-conditioning
revolution 1/min : 2125
Checkbk. volt
mV : 2500
Output
temperature °C : 61
Speed 1/min : 750
Checkbk. volt
mV : 2460
Measuring
temperature °C : 57
Fuel delivery cm^3/
> 1000s : 40.8...41.2
Dispersion cm^3/ : 2.5
> 1000s :

Test specifications of injection pump
Check values in brackets

Supply pump pressure variations:

1st speed 1/min : 2125
Checkbk. volt
mV : 3900
Supply pump
pressure > bar : 7.9...8.9
> bar :

Timing device variations:

1st speed 1/min : 500
Checkbk. volt. mV : 3900
Timing device
travel mm : 7.5...9.9
> mm : (7.2...10.2)

2nd speed 1/min : 750
Checkbk. volt. mV : 3900
Timing device
travel mm :
> mm : (7.5...11.3)

3rd speed 1/min : 1200
Checkbk. volt. mV : 1800
Timing device
travel mm : max. 0.3
> mm : (max. 1.0)
Solenoid valve
Start of
injection, volts : 12

4.th speed 1/min : 2125
Checkbk. volt. mV : 3900
Timing device
travel mm : 11.6...12.6
> mm : (11.5...12.7)

Overflow at overflow valve:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt. mV : 2500
Output
temperature °C : 51
Speed 1/min : 2125
Checkbk. volt. mV : 3900
Measuring
temperature °C : 53
Overflow : 60...170
> cm^3/10s :

H20

H20

Fuel delivery variations:

1st temperature-conditioning		
revolution	1/min	: 100
Checkbk. volt	mV	: 2500
Output		
temperature	°C	: 51
Speed	1/min	: 2125
Checkbk. volt	mV	: 3910
Meßtemperatur	°C	: 53
Fuel delivery	cm³/	: 55.7...58.3
>	1000s	: (55.0...59.0)
Dispersion	cm³/	: 3.0
>	1000s.	:
2nd temperature-conditioning		
revolution	1/min	: 2125
Checkbk. volt	mV	: 2500
Output		
temperature	°C	: 60
Speed	1/min	: 1000
Checkbk. volt	mV	: 3210
Measuring		
temperature	°C	: 56
Fuel delivery	cm³/	: 58.0...60.6
>	1000s	: (57.3...61.3)
Dispersion	cm³/	: 2.0
>	1000s	: (2.5)
3rd temperature-conditioning		
revolution	1/min	: 2125
Checkbk. volt	mV	: 2500
Output		
temperature	°C	: 61
Speed	1/min	: 750
Checkbk. volt	mV	: 2460
Measuring		
temperature	°C	: 57
Fuel delivery	cm³/	:
>	1000s	: (39.7...42.3)
Dispersion	cm³/	:
>	1000s	:
4th temperature-conditioning		
revolution	1/min	: 2125
Checkbk. volt	mV	: 2500
Output		
temperature	°C	: 61
Speed	1/min	: 500
Checkbk. volt	mV	: 2320
Measuring		
temperature	°C	: 57
Fuel delivery	cm³/	: 41.1...44.0
>	1000s	: (40.7...44.7)
Dispersion	cm³/	: 3,0
>	1000s	:

Idle delivery:

1st temperature-conditioning		
revolution	1/min	: 2125
Checkbk. volt	mV	: 2500
Output		
temperature	°C	: 61
Speed	1/min	: 500
Checkbk. volt	mV	: 1520
Meßtemperatur	°C	: 57
Fuel delivery	cm³/	: 9.0...13.0
>	1000s	: (8.0...14.0)
Solenoid valve		
Start of		
injection, volts		: 12
Dispersion	cm³/	: 3.0
>	1000s	: (4.0)

Starting fuel delivery:

1st temperature-conditioning		
revolution	1/min	: 2125
Checkbk. volt	mV	: 2500
Output		
temperature	°C	: 65
Speed	1/min	: 100
Checkbk. volt	mV	: 2960
Measuring		
temperature	°C	: 61
Fuel delivery	cm³/	: 79.0...91.0
>	1000s	: (74.0...96.0)
Solenoid valve		
Start of		
injection, volts		: 12

Stop test:

Speed	1/min	: 1500
Checkbk. volt	mV	: 4125
ELAB	volts	: 0
Fuel delivery	cm³/	:
max.	1000s	: 3.0
Start of		
Solenoid valve		
Start of		
injection, volts		: 12
Speed	1/min	: 750
Checkbk. volt	mV	: 2460
ELAB	volts	: 0
Fuel delivery	cm³/	:
max.	1000s	: 5.0
Start of		

Shutoff solenoid:

Cut-in voltage		
min.> volts		: 10,0
Rated voltage,		
	volts	: 12,0

H21

H21 A

Notes:
High-pressure compressor sensor
Testing only possible with ballast
EPS 910

Take note of test instructions
"Distributor pump for direct
injectors"!

Dimensions for mounting and setting:

Description		
K	mm	: 2.7...2.9
KF	mm	: 6.5...6.9
SVS max.	mm	:
FH	mm	:
TS		: 1 467 010 494

H22

H22

BOSCH INJECTION PUMP TEST SPECIFICATIONS

Obsereve notes in remark colum

Test sheet : MB
Date of manufacture :
Edition : 05.12.1995
Replaces :
Test oil : ISO 4113

Injection pump : VE5/11E1900R641

Type No. : 0 460 415 992
Customer Ident.No. :

Customer-specific details
Customer : Mercedes-Benz

Engine : T1N-2-Fh

Output kW :
Speed 1/min :

TEST BENCH PREREQUISITES

Inlet pres··re, bar : 0.30...0.40

Calibrating nozzle-holder assembly > : 1 688 901 116

Opening pressure > bar : 207...210

Test pressure line : 1 680 750 085

Outer diameter : 6.00
x wall thickness > : 2.20
x length > mm : 350

Overflow valve : 2 467 413 018

Test line : 0 986 612 698
(fuel-delivery actuator) : (KDEP 1865/10)

Test line : Prüfkabelset
(solenoid valve start of injection) : (1 687 011 208)

TEST PRECONDITIONS

Test oil return temp. > °C with thermometer : 55

Test oil supply temperature > °C : 42...47

Hold-up revolutions >1/min : 1200
Feedback voltage mV : 2500

ELECTRICAL TEST

Actuator
Connections 12 and 13
Test temperature:
15°...30°C, ohms : 0.4...1.0
50°...70°C, ohms : 0.45...1.1

Connections 13 and. ground, Mohms min. : 1.0
Connections 12 and ground, Mohms min. : 1.0
Connections 8 and 13
Mohms min. : 1.0
Connections 12 and 1
Mohms min. : 1.0

High-pressure compressor sensor
Sensor coils
Connections 8 and 7
Ohms : 4.9...6.5
Connections 6 and 7
Ohms : 4.9...6.5
Connections 6 and 8
Ohms : 9.8...13.0

Connections 6 and. ground, Mohms min. : 1.0
Connections 7 and ground, Mohms min. : 1.0
Connections 8 and ground, Mohms min. : 1.0

Temperature sensor, fuel
Connentions 1 and 2
Test temperature:
15°...30°C, kohms : 1.2...4.0
50°...70°C, kohms : 0.3...1.2

Connections 1 and ground, Mohms min. : 1.0
Connections 2 and ground Mohms min. : 1.0

Solenoid valve, start of injection
Connections 1 and 2
Test temperature :
15°...30°C, ohms : 14.3...17.3
50°...70°C, ohms : 15.5...21.0

Starting stop mV : 4120...4650

Shutoff stop mV : 650...850

H23

H23

Setting values of injection pump
Check values in brackets

Supply pump pressure:
Speed 1/min : 500
Checkbk. volt.
mV : 2620
Setting value, bar : 9.3...9.5
: (9.1...9.7)

Timing device travel:
Speed 1/min : 500
Checkbk. volt
mV : 2620
Setting value, mm : 11.9...12.7
: (11.0...13.6)

Full-load delivery :
1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt
mV : 2500
Output
temperature °C : 61
Speed 1/min : 750
Checkbk. volt
mV : 2520
Measuring
temperature °C : 57
Fuel delivery cm³/ : 51.3...51.7
> 1000s : (49.5...53.5)
Dispersion cm³/ : 2.5
> 1000s :

Test specifications of injection pump
Check values in brackets

Supply pump pressure variations:

1st speed 1/min : 1900
Checkbk. volt
mV : 3570
Supply pump
pressure > bar : 11.3...11.9
> bar : (11.1...12.1)

2st speed 1/min : 200
Checkbk. volt
mV : 2620
Supply pump
pressure > bar : 4.6...6.6
> bar : (4.4...6.8)

Timing device variations:

1st speed 1/min : 1900
Checkbk. volt. mV : 3570
Timing device
travel mm : 11.8...12.8
> mm : (11.5...13.1)

2nd speed 1/min : 200
Checkbk. volt. mV : 2620
Timing device
travel mm : 3.0...6.0
> mm : (1.3...7.7)

3rd speed 1/min : 1900
Checkbk. volt. mV : 1500
Timing device
travel mm : 0...3.5
> mm :
Solenoid valve
Start of
injection, volts : 12

4.th speed 1/min : 1100
Checkbk. volt. mV : 1530
Timing device
travel mm : 0...0.6
> mm : (0...0.8)
Solenoid valve
Start of
injection, volts : 12
Overflow at overflow valve:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt. mV : 2500
Output
temperature °C : 51
Speed 1/min : 1900
Checkbk. volt. mV : 3570
Measuring
temperature °C : 53
Overflow : 137...192
> cm³/10s : (123...206)

H24

Fuel delivery variations:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt mV : 2500
Output
temperature °C : 51
Speed 1/min : 1900
Checkbk. volt mV : 3570
Meßtemperatur °C : 53
Fuel delivery cm³/ : 68.1...70.5
> 1000s : (66.6...72.0)
Dispersion cm³/ : 2.5
> 1000s. :

2nd temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 60
Speed 1/min : 1000
Checkbk. volt mV : 3080
Measuring
temperature °C : 56
Fuel delivery cm³/ : 69.3...71.9
> 1000s : (68.6...72.6)
Dispersion cm³/ : 4.0
> 1000s :

3rd temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 500
Checkbk. volt mV : 2620
Measuring
temperature °C : 57
Fuel delivery cm³/ : 62.7...65.3
> 1000s : (62.0...66.0)
Dispersion cm³/ :
> 1000s :

Idle delivery:
1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 340
Checkbk. volt mV : 2000
Meßtemperatur °C : 57
Fuel delivery cm³/ : 13.5...17.5
> 1000s : (12.5...18.5)
Solenoid valve
Start of
injection, volts : 12
Dispersion cm³/ : 3.0
> 1000s : (4.0)

Starting fuel delivery:
1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 65
Speed 1/min : 100
Checkbk. volt mV : 3110
Measuring
temperature °C : 61
Fuel delivery cm³/ : 75.6
> 1000s :
Solenoid valve
Start of
injection, volts : 12

Stop test:
Speed 1/min : 1000
Checkbk. volt mV : 4000
ELAB volts : 0
Fuel delivery cm³/ :
max. 1000s : 3.0
Start of

Shutoff solenoid:
Cut-in voltage
min.> volts : 10.0
Rated voltage,
volts : 12.0

Notes:
High-pressure compressor sensor
Testing only possible with ballast
EPS 910

Take note of test instructions
"Distributor pump for direct
injectors"!

Dimensions for mounting and setting:

Description
K mm : 3.2...3.4
KF mm : 8.2...8.6
SVS max. mm :
FH mm :
TS : 1 467 010 495

J1

J1

BOSCH INJECTION PUMP TEST SPECIFICATIONS

Obsereve notes in remark colum

Test sheet	: VW
Date of manufacture	:
Edition	: 22.10.1996
Replaces	:
Test oil	: ISO 4113
Injection pump	: VE4/10E2100R701
Type No.	: 0 460 404 976
Customer Ident.No.	:

Customer-specific details

Customer	: VW
Engine	: 1.7 SDI EDC
Output kW	:
Speed 1/min	:

TEST BENCH PREREQUISITES

Inlet pressure, bar	: 0.30...0.40
Calibrating nozzle-holder assembly >	: 1 688 901 114
Opening pressure > bar	: 207...210
Test pressure line	: 1 680 750 085
Outer diameter	: 6.00
x wall thickness >	: 2.20
x length > mm	: 350
Overflow valve	: 2 467 413 018
Test line (fuel-delivery actuator)	: 0 986 612 444
Test line (solenoid valve start of injection)	: 1 687 011 208 (Test cable set)

TEST PRECONDITIONS

Test oil return temp. > °C with thermometer	: 55
Test oil supply temperature > °C	: 42...47
Hold-up revolutions >1/min	: 1200
Feedback voltage mV	: 2500

ELECTRICAL TEST

Actuator
Connections 5 and 6
Test temperature:

15°...30°C, ohms	: 0.4...1.0
50°...70°C, ohms	: 0.45...1.1
Connections 5 and. ground, Mohms min.	: 1.0
Connections 6 and ground, Mohms min.	: 1.0
Connections 3 and 5 Mohms min.	: 1.0
Connections 6 and 7 Mohms min.	: 1.0

High-pressure compressor sensor
Sensor coils

Connections 1 and 2 Ohms	: 4.9...6.5
Connections 2 and 3 Ohms	: 4.9...6.5
Connections 1 and 3 Ohms	: 9.8...13.0
Connections 1 and. ground, Mohms min.	: 1.0
Connections 2 and ground, Mohms min.	: 1.0
Connections 3 and ground, Mohms min.	: 1.0

Temperature sensor, fuel
Connentions 4 and 7
Test temperature:

15°...30°C, kohms	: 1.2...4.0
50°...70°C, kohms	: 0.3...1.2
Connections 4 and ground, Mohms min.	: 1.0
Connections 7 and ground Mohms min.	: 1.0

Solenoid valve, start of injection
Connections 1 and 2
Test temperature :

15°...30°C, ohms	: 14.3...17.3
50°...70°C, ohms	: 15.5...21.0
Starting stop mV	: 4120...4650
Shutoff stop mV	: 650...850

J2

J2

Setting values of injection pump
Check values in brackets

Supply pump pressure:
Speed 1/min : 500
Checkbk. volt.
mV : 2510
Setting value, bar : 7.8...8.6

Timing device travel:
Speed 1/min : 500
Checkbk. volt
mV : 2510
Setting value, mm : 9.6...9.8

Full-load delivery :
1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt
mV : 2500
Output
temperature °C : 61
Speed 1/min : 800
Checkbk. volt
mV : 2650
Measuring
temperature °C : 57
Fuel delivery cm^3/
> 1000s : 34.8...35.2
Dispersion cm^3/ : 2.5
> 1000s :

Test specifications of injection pump
Check values in brackets

Supply pump pressure variations:

1st speed 1/min : 2100
Checkbk. volt
mV : 3330
Supply pump
pressure > bar : 10.4...11.4
> bar :

2st speed 1/min : 300
Checkbk. volt
mV : 2510
Supply pump
pressure > bar : 6.8...8.2
> bar :

Timing device variations:

1st speed 1/min : 500
Checkbk. volt. mV : 2510
Timing device
travel mm :
> mm : (8.7...10.7)

2nd speed 1/min : 2100
Checkbk. volt. mV : 3330
Timing device
travel mm : 11.8...12.8
> mm : (11.5...13.1)

3rd speed 1/min : 2100
Checkbk. volt. mV : 1440
Timing device
travel mm : max. 3.0
> mm :
Solenoid valve
Start of
injection, volts : 12

4.th speed 1/min : 300
Checkbk. volt. mV : 2510
Timing device
travel mm : 6.5...10.5
> mm : (5.1...11.9)

Overflow at overflow valve:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt. mV : 2500
Output
temperature °C : 51
Speed 1/min : 2100
Checkbk. volt. mV : 3330
Measuring
temperature °C : 53
Overflow : 116...200
> cm^3/10s :

J3

J3

Fuel delivery variations:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt mV : 2500
Output
temperature °C : 51
Speed 1/min : 2100
Checkbk. volt mV : 3330
Meßtemperatur °C : 53
Fuel delivery cm³/ : 36.3...38.7
> 1000s : (35.7...39.3)
Dispersion cm³/ : 3.0
> 1000s. :

2nd temperature-conditioning
revolution 1/min : 100
Checkbk. volt mV : 2500
Output
temperature °C : 51
Speed 1/min : 1100
Checkbk. volt mV : 2880
Measuring
temperature °C : 53
Fuel delivery cm³/ : 34,9...37.3
> 1000s : (34.3...37.9)
Dispersion cm³/ :
> 1000s :

3rd temperature-conditioning
revolution 1/min : 100
Checkbk. volt mV : 2500
Output
temperature °C : 51
Speed 1/min : 1100
Checkbk. volt mV : 2420
Measuring
temperature °C : 53
Fuel delivery cm³/ : 25.4...27.8
> 1000s : (25.1...28.1)
Dispersion cm³/ :
> 1000s :

4th temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 800
Checkbk. volt mV : 2650
Measuring
temperature °C : 57
Fuel delivery cm³/ :
> 1000s : (33.7...36.3)
Dispersion cm³/ :
> 1000s : (2.5)

5th temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 500
Checkbk. volt mV : 2510
Measuring
temperature °C : 57
Fuel delivery cm³/ : 35.5...38.1
> 1000s : (34.8...38.8)
Dispersion cm³/ : 3.0
> 1000s :

Idle delivery:
1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 400
Checkbk. volt mV : 1820
Meßtemperatur °C : 57
Fuel delivery cm³/ : 5.6...9.6
> 1000s : (4.6...10.6)
Solenoid valve
Start of
injection, volts : 12
Dispersion cm³/ : 3.0
> 1000s : (4.0)

Starting fuel delivery:
1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 65
Speed 1/min : 100
Checkbk. volt mV : 2820
Measuring
temperature °C : 61
Fuel delivery cm³/ : 43.0...53.0
> 1000s : (40.0...56.0)
Solenoid valve
Start of
injection, volts : 12

Stop test:
Speed 1/min : 1000
Checkbk. volt mV : 3330
ELAB volts : 0
Fuel delivery cm³/ :
max. 1000s : 3.0
Start of

Shutoff solenoid:
Cut-in voltage
min.> volts : 10.0
Rated voltage,
volts : 12.0

J4

J4

Notes:
High-pressure compressor sensor
Testing only possible with ballast
EPS 910

Take note of test instructions
"Distributor pump for direct
injectors"!

Dimensions for mounting and setting:

Description		
K	mm	:
KF	mm	: 8.2...8.6
SVS max.	mm	:
FH	mm	:
TS		: 1 467 010 495

J5

J5

BOSCH INJECTION PUMP TEST SPECIFICATIONS

Obsereve notes in remark colum

Test sheet : Audi
Date of manufacture :
Edition : 17.03.1997
Replaces :
Test oil : ISO 4113

Injection pump : VE4/10E2250R530-1

Type No. : 0 460 404 983
Customer Ident.No. :

Customer-specific details
Customer : Audi

Engine : 1.9 TDI EDC

Output kW :
Speed 1/min :

TEST BENCH PREREQUISITES

Inlet pressure, bar : 0.30...0.40

Calibrating nozzle-
holder assembly > : 1 688 901 114

Opening
pressure > bar : 207...210

Test pressure line : 1 680 750 085

Outer diameter : 6.00
x wall thickness > : 2.20
x length > mm : 350

Overflow valve : 2 467 413 018

Test line : 0 986 612 440
(fuel-delivery
actuator) : (KDEP 1865/10)

Test line : 0 986 611 983
Solenoid valve
start of injection) : (KDEP 1190)

TEST PRECONDITIONS

Test oil
return temp. > °C
with thermometer : 55

Test oil supply
temperature > °C : 42...47

Hold-up
revolutions >1/min : 1200
Feedback
voltage mV : 2500

ELECTRICAL TEST

Actuator
Connections 4 and 7
Test temperature:
15°...30°C, ohms : 0.4...1.0
50°...70°C, ohms : 0.45...1.1

Connections 4 and.
ground, Mohms min. : 1.0
Connections 7 and
ground, Mohms min. : 1.0
Connections 3 and 4
Mohms min. : 1.0
Connections 6 and 7
Mohms min. : 1.0

High-pressure compressor sensor
Sensor coils
Connections 1 and 3
Ohms : 4.9...6.5
Connections 2 and 3
Ohms : 4.9...6.5
Connections 1 and 2
Ohms : 9.8...13.0

Connections 1 and.
ground, Mohms min. : 1.0
Connections 2 and
ground, Mohms min. : 1.0
Connections 3 and
ground, Mohms min. : 1.0

Temperature sensor, fuel
Connentions 5 and 6
Test temperature:
15°...30°C, kohms : 1.2...4.0
50°...70°C, kohms : 0.3...1.2

Connections 5 and
ground, Mohms min. : 1.0
Connections 6 and
ground Mohms min. : 1.0

Solenoid valve, start of injection
Connections 1 and 2
Test temperature :
15°...30°C, ohms : 14.3...17.3
50°...70°C, ohms : 15.5...21.0

Starting stop mV : 4120...4650

Shutoff stop mV : 650...850

J6

J6

Setting values of injection pump
Check values in brackets

Supply pump pressure:

Speed	1/min	: 500
Checkbk. volt. mV		: 2245
Setting value, bar		: 6.0...7.4

Timing device travel:

Speed	1/min	: 500
Checkbk. volt mV		: 2245
Setting value, mm		: 10.8...11.0

Full-load delivery :

1st temperature-conditioning revolution	1/min	: 2000
Checkbk. volt mV		: 2500
Output temperature °C		: 61
Speed	1/min	: 750
Checkbk. volt mV		: 2480
Measuring temperature °C		: 57
Fuel delivery	cm^3/1000s	: 38.8...39.2
Dispersion >	cm^3/1000s	: 2.5

Test specifications of injection pump
Check values in brackets

Supply pump pressure variations:

1st speed	1/min	: 2000
Checkbk. volt mV		: 3890
Supply pump pressure >	bar	: 8.4...9.8
>	bar	: (8.3...9.9)
2nd speed	1/min	: 150
Checkbk. volt mV		: 2230
Supply pump pressure >	bar	: min. 3.5
>	bar	:

Timing device variations:

1st speed	1/min	: 500
Checkbk. volt. mV		: 2245
Timing device travel	mm	:
>	mm	: (9.9...11.9)
2nd speed	1/min	: 2000
Checkbk. volt. mV		: 3890
Timing device travel	mm	: 11.5...12.9
>	mm	: (11.4...13.0)
3rd speed	1/min	: 1400
Checkbk. volt. mV		: 1475
Timing device travel	mm	: max. 0.5
>	mm	: (max. 0.8)
Solenoid valve Start of injection,	volts	: 12
4.th speed	1/min	: 300
Checkbk. volt. mV		: 2245
Timing device travel	mm	: 8.9...12.1
>	mm	: (8.5...12.5)

Overflow at overflow valve:

1st temperature-conditioning revolution	1/min	: 100
Checkbk. volt. mV		: 2500
Output temperature °C		: 51
Speed	1/min	: 2000
Checkbk. volt. mV		: 3890
Measuring temperature °C		: 53
Overflow		: 83...167
>	cm^3/10s	:

J7

J7

Fuel delivery variations:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt mV : 2500
Output
temperature °C : 51
Speed 1/min : 2000
Checkbk. volt mV : 3890
Meßtemperatur °C : 53
Fuel delivery cm³/ : 48.2...51.2
> 1000s : (47.9...51.5)
Dispersion cm³/ : 2.5
> 1000s. : (2.5)

2nd temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 750
Checkbk. volt mV : 2480
Measuring
temperature °C : 57
Fuel delivery cm³/ :
> 1000s : (37.7...40.3)
Dispersion cm³/ :
> 1000s : (2.5)

3rd temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 500
Checkbk. volt mV : 2245
Measuring
temperature °C : 57
Fuel delivery cm³/ : 36.7...39.7
> 1000s : (35.9...40.5)
Dispersion cm³/ : 3.0
> 1000s : (3.0)

Idle delivery:

1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 500
Checkbk. volt mV : 1600
Meßtemperatur °C : 57
Fuel delivery cm³/ : 11.2...16.8
> 1000s : (11.0...17.0)
Solenoid valve
Start of
injection, volts : 12
Dispersion cm³/ : 4.0
> 1000s : (4.0)

Starting fuel delivery:

1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 65
Speed 1/min : 100
Checkbk. volt mV : 2230
Measuring
temperature °C : 61
Fuel delivery cm³/ : 32.4...44.4
> 1000s : (30.4...46.4)
Solenoid valve
Start of
injection, volts : 12

Stop test:

Speed 1/min : 750
Checkbk. volt mV : 2480
ELAB volts : 0
Fuel delivery cm³/ :
max. 1000s : 3.0

Shutoff solenoid:
Cut-in voltage
min.> volts : 10.0
Rated voltage,
volts : 12.0

J8

J8

Notes:
High-pressure compressor sensor
Testing only possible with ballast
EPS 910

Take note of test instructions
"Distributor pump for direct
injectors"!

Dimensions for mounting and setting:

Description		
K	mm	:
KF	mm	: 6.2...6.6
SVS max.	mm	:
FH	mm	:
TS		: 1 467 010 410

BOSCH INJECTION PUMP TEST SPECIFICATIONS

Obsereve notes in remark colum

Test sheet	: Chrysler
Date of manufacture	:
Edition	: 24.01.1997
Replaces	:
Test oil	: ISO 4113
Injection pump	: VE4/10E2100L694-1
Type No.	: 0 460 404 963
Customer Ident.No.	:

Customer-specific details

Customer	: Chrysler
Engine	: 425 CLIEE
Output kW	:
Speed 1/min	:

TEST BENCH PREREQUISITES

Inlet pressure, bar	: 0.30...0.40
Calibrating nozzle-holder assembly >	: 1 688 901 022
Opening pressure > bar	: 130...133
Test pressure line	: 1 680 750 073
Outer diameter	: 6.00
x wall thickness >	: 2.00
x length > mm	: 450
Overflow valve	: 2 467 413 018
Test line (fuel-delivery actuator)	: 0 986 612 445
Test line (solenoid valve start of injection)	: 1 687 011 208 : (Test cable set)

ELECTRICAL TEST

Actuator
Connections 8 and 9
Test temperature:

15°...30°C, ohms	: 0.4...1.0
50°...70°C, ohms	: 0.45...1.1
Connections 8 and. ground, Mohms min.	: 1.0
Connections 9 and ground, Mohms min.	: 1.0
Connections 2 and 8 Mohms min.	: 1.0
Connections 7 and 9 Mohms min.	: 1.0

High-pressure compressor sensor
Sensor coils

Connections 1 and 2 kohms	: 4.9...6.5
Connections 3 and 2 kohms	: 4.9...6.5
Connections 1 and 3 kohms	: 9.8...13.0
Connections 1 and. ground, Mohms min.	: 1.0
Connections 2 and ground, Mohms min.	: 1.0
Connections 3 and ground, Mohms min.	: 1.0

Temperature sensor, fuel
Connentions 4 and 7
Test temperature:

15°...30°C, kohms	: 1.2...4.0
50°...70°C, kohms	: 0.3...1.2
Connections 4 and ground, Mohms min.	: 1.0
Connections 7 and ground Mohms min.	: 1.0

Solenoid valve, start of injection
Connections 1 and 2
Test temperature :

15°...30°C, ohms	: 14.3...17.3
50°...70°C, ohms	: 15.5...21.0
Starting stop mV	: 4120...4650
Shutoff stop mV	: 650...850

J10

J10

Setting values of injection pump
Check values in brackets

Supply pump pressure:
Speed 1/min : 1000
Checkbk. volt.
mV : 3100
Setting value, bar : 6.4...7.8

Timing device travel:
Speed 1/min : 1000
Checkbk. volt
mV : 3100
Setting value, mm : 6.9...7.1

Full-load delivery :
Speed 1/min : 1250
Checkbk. volt
mV : 2270
Fuel delivery cm³/
> 1000s : 30.6...31.0
Dispersion cm³/ : 2.5
> 1000s :

Test specifications of injection pump
Check values in brackets

Supply pump pressure variations:

1st speed 1/min : 2100
Checkbk. volt
mV : 3100
Supply pump
pressure > bar : 8.0...9.4
> bar :

2st speed 1/min : 500
Checkbk. volt
mV : 3100
Supply pump
pressure > bar : 6.0...7.4
> bar :

3st speed 1/min : 150
Checkbk. volt
mV : 3680
Supply pump
pressure > bar : min. 3.5
> bar :

Timing device variations:

1st speed 1/min : 500
Checkbk. volt. mV : 3100
Timing device
travel mm : 6.9...7.1
> mm : (5.0...7.0)

2nd speed 1/min : 1000
Checkbk. volt. mV : 3100
Timing device
travel mm :
> mm : (6.1...7.9)

3rd speed 1/min : 1500
Checkbk. volt. mV : 1680
Timing device
travel mm : 0.0...0.5
> mm : (0.0...1.5)
Solenoid valve
Start of
injection, volts : 12

Overflow at overflow valve:

Speed 1/min : 2100
Checkbk. volt. mV : 3100
Overflow : 56...167
> cm³/10s :

Fuel delivery variations:

1. Speed	1/min	: 2100
Checkbk. volt	mV	: 3100
Fuel delivery	cm³/	: 63.5...66.5
>	1000s	: (63.0...67.0)
Dispersion	cm³/	:
>	1000s.	:
2. Speed	1/min	: 1250
Checkbk. volt	mV	: 2270
Fuel delivery	cm³/	:
>	1000s	: (29.5...32.1)
Dispersion	cm³/	:
>	1000s	: (3.0)
3. Speed	1/min	: 1000
Checkbk. volt	mV	: 3100
Fuel delivery	cm³/	: 67.7...69.7
>	1000s	: (66.2...70.2)
Dispersion	cm³/	: 2.0
>	1000s	:
4. Speed	1/min	: 500
Checkbk. volt	mV	: 2660
Fuel delivery	cm³/	: 43.4...46.4
>	1000s	: (42.9...46.9)
Dispersion	cm³/	: 2.0
>	1000s	:

Idle delivery:

Speed	1/min	: 400
Checkbk. volt	mV	: 2000
Fuel delivery	cm³/	: 12.1...15.5
>	1000s	: (11.5...16.1)
Solenoid valve		
Start of		
injection, volts		: 12
Dispersion	cm³/	: 2.0
>	1000s	: (3.0)

Starting fuel delivery:

Speed	1/min	: 100
Checkbk. volt	mV	: 3680
Fuel delivery	cm³/	:
>	1000s	: 72.0...82.0
Solenoid valve		
Start of		
injection, volts		: 12

Stop test:

Speed	1/min	: 2100
Checkbk. volt	mV	: 3100
ELAB	volts	: 0
Fuel delivery	cm³/	: 3.0
max.	1000s	:

Shutoff solenoid:

Cut-in voltage	
min.> volts	: 10.0
Rated voltage,	
volts	: 12.0

Dimensions for mounting and setting:

Description		
K	mm	:
KF	mm	:
SVS max.	mm	:
FH	mm	:

J12

J12

BOSCH INJECTION PUMP TEST SPECIFICATIONS

Obsereve notes in remark colum

Test sheet	: VW
Date of manufacture	:
Edition	: 14.02.1997
Replaces	:
Test oil	: ISO 4113
Injection pump	: VE4/10E2250R640-3
Type No.	: 0 460 404 964
Customer Ident.No.	:

Customer-specific details

Customer	: VW
Engine	: 1.9 SDI EDC
Output kW	:
Speed 1/min	:

TEST BENCH PREREQUISITES

Inlet pressure, bar	: 0.30...0.40
Calibrating nozzle-holder assembly >	: 1 688 901 114
Opening pressure > bar	: 207...210
Test pressure line	: 1 680 750 085
Outer diameter	: 6.00
x wall thickness >	: 2.20
x length > mm	: 350
Overflow valve	: 2 467 413 018
Test line	: 0 986 612 439
(fuel-delivery actuator)	: (KDEP 1865/10)
Test line	: 0 986 611 983
(solenoid valve start of injection)	: (KDEP 1190)

TEST PRECONDITIONS

Test oil return temp. > °C with thermometer	: 55
Test oil supply temperature > °C	: 42...47
Hold-up revolutions >1/min	: 1200
Feedback voltage mV	: 2500

ELECTRICAL TEST

Actuator
Connections 5 and 6
Test temperature:

15°...30°C, ohms	: 0.4...1.0
50°...70°C, ohms	: 0.45...1.1
Connections 5 and. ground, Mohms min.	: 1.0
Connections 6 and ground, Mohms min.	: 1.0
Connections 3 and 5 Mohms min.	: 1.0
Connections 6 and 7 Mohms min.	: 1.0

High-pressure compressor sensor
Sensor coils

Connections 1 and 2 Ohms	: 4.9...6.5
Connections 2 and 3 Ohms	: 4.9...6.5
Connections 1 and 3 Ohms	: 9.8...13.0
Connections 1 and. ground, Mohms min.	: 1.0
Connections 2 and ground, Mohms min.	: 1.0
Connections 3 and ground, Mohms min.	: 1.0

Temperature sensor, fuel
Connentions 4 and 7
Test temperature:

15°...30°C, kohms	: 1.2...4.0
50°...70°C, kohms	: 0.3...1.2
Connections 4 and ground, Mohms min.	: 1.0
Connections 7 and ground Mohms min.	: 1.0

Solenoid valve, start of injection
Connections 1 and 2
Test temperature :

15°...30°C, ohms	: 14.3...17.3
50°...70°C, ohms	: 15.5...21.0
Starting stop mV	: 4120...4650
Shutoff stop mV	: 650...850

J13

J13

Setting values of injection pump
Check values in brackets

Supply pump pressure:
Speed 1/min : 500
Checkbk. volt.
mV : 2360
Setting value, bar : 5.6...7.0

Timing device travel:
Speed 1/min : 500
Checkbk. volt
mV : 2360
Setting value, mm : 10.6...10.8

Full-load delivery :
1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt
mV : 2500
Output
temperature °C : 61
Speed 1/min : 800
Checkbk. volt
mV : 2550
Measuring
temperature °C : 57
Fuel delivery cm^3/
> 1000s : 34.6...35.0
Dispersion cm^3/ : 2.5
> 1000s :

Test specifications of injection pump
Check values in brackets

Supply pump pressure variations:

1st speed 1/min : 2100
Checkbk. volt
mV : 3370
Supply pump
pressure > bar : 8.3...9.7
> bar : (8.2...9.8)

2st speed 1/min : 300
Checkbk. volt
mV : 2360
Supply pump
pressure > bar : 5.2...6.8
> bar : (5.1...6.9)

Timing device variations:

1st speed 1/min : 500
Checkbk. volt. mV : 2360
Timing device
travel mm :
> mm : (9.7...11.7)

2nd speed 1/min : 2100
Checkbk. volt. mV : 3370
Timing device
travel mm : 11.5...12.9
> mm : (11.4...13.0)

3rd speed 1/min : 2100
Checkbk. volt. mV : 1400
Timing device
travel mm : max. 3.2
> mm : (max. 4.0)
Solenoid valve
Start of
injection, volts : 12

4.th speed 1/min : 300
Checkbk. volt. mV : 2360
Timing device
travel mm : 8.4...11.2
> mm : (8.2...11.4)

Overflow at overflow valve:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt. mV : 2500
Output
temperature °C : 51
Speed 1/min : 2100
Checkbk. volt. mV : 3370
Measuring
temperature °C : 53
Overflow : 109...164
> cm^3/10s : (82...192)

J14

J14

Fuel delivery variations:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt mV : 2500
Output
temperature °C : 51
Speed 1/min : 2100
Checkbk. volt mV : 3370
Meßtemperatur °C : 53
Fuel delivery cm³/ : 36.2...38.2
> 1000s : (35.9...39.5)
Dispersion cm³/ : 2.5
> 1000s. : (2.5)

2nd temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 800
Checkbk. volt mV : 2550
Measuring
temperature °C : 57
Fuel delivery cm³/ :
> 1000s : (33.5...36.1)
Dispersion cm³/ :
> 1000s : (3.0)

3rd temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 500
Checkbk. volt mV : 2360
Measuring
temperature °C : 57
Fuel delivery cm³/ : 35.6...38.6
> 1000s : (35.3...38.9)
Dispersion cm³/ : 3.0
> 1000s : (3.0)

Idle delivery:
1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 400
Checkbk. volt mV : 1640
Meßtemperatur °C : 57
Fuel delivery cm³/ : 6.0...11.0
> 1000s : (5.5...11.5)
Solenoid valve
Start of
injection, volts : 12
Dispersion cm³/ : 3.0
> 1000s : (4.0)

Starting fuel delivery:
1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 65
Speed 1/min : 100
Checkbk. volt mV : 2730
Measuring
temperature °C : 61
Fuel delivery cm³/ : 42.0...54.0
> 1000s : (40.0...56.0)
Solenoid valve
Start of
injection, volts : 12

Stop test:
Speed 1/min : 750
Checkbk. volt mV : 3650
ELAB volts : 0
Fuel delivery cm³/ :
max. 1000s : 3.0
Start of

Shutoff solenoid:
Cut-in voltage
min.> volts : 10.0
Rated voltage,
volts : 12.0

Notes:
High-pressure compressor sensor
Testing only possible with ballast
EPS 910

Take note of test instructions
"Distributor pump for direct
injectors"!

Dimensions for mounting and setting:

Description		
K	mm	:
KF	mm	: 6.2...6.6
SVS max.	mm	:
FH	mm	:
TS		: 1 467 010 410

J15

BOSCH INJECTION PUMP TEST SPECIFICATIONS

Obsereve notes in remark colum

Test sheet : Nissan
Date of manufacture :
Edition : 24.03.1997
Replaces :
Test oil : ISO 4113

Injection pump : VE4/10E2200L736

Type No. : 0 460 404 965
Customer Ident.No. :

Customer-specific details
Customer : Nissan

Engine : CD 20 T

Output kW :
Speed 1/min :

TEST BENCH PREREQUISITES

Inlet pressure, bar : 0.30...0.40

Calibrating nozzle-
holder assembly > : 1 688 901 022

Opening
pressure > bar : 130...133

Test pressure line : 1 680 750 073

Outer diameter : 6.00
x wall thickness > : 2.00
x length > mm : 450

Overflow valve :

Overflow valve :

Test line : 0 986 612 442
(fuel-delivery actuator)

Test line : 1 687 011 208
(solenoid valve
start of injection) : (Test cable set)

ELECTRICAL TEST

Actuator
Connections 4 and 7
Test temperature:
15°...30°C, ohms : 0.4...1.0
50°...70°C, ohms : 0.45...1.1

Connections 4 and.
ground, Mohms min. : 1.0
Connections 7 and
ground, Mohms min. : 1.0
Connections 2 and 7
Mohms min. : 1.0
Connections 4 and 6
Mohms min. : 1.0

High-pressure compressor sensor
Sensor coils
Connections 1 and 3
kohms : 4.9...6.5
Connections 2 and 3
kohms : 4.9...6.5
Connections 1 and 2
kohms : 9.8...13.0

Connections 1 and.
ground, Mohms min. : 1.0
Connections 2 and
ground, Mohms min. : 1.0
Connections 3 and
ground, Mohms min. : 1.0

Temperature sensor, fuel
Connentions 5 and 6
Test temperature:
15°...30°C, kohms : 1.2...4.0
50°...70°C, kohms : 0.3...1.2

Connections 5 and
ground, Mohms min. : 1.0
Connections 6 and
ground Mohms min. : 1.0

Solenoid valve, start of injection
Connections 1 and 2
Test temperature :
15°...30°C, ohms : 14.3...17.3
50°...70°C, ohms : 15.5...21.0

Starting stop mV : 4120...4650

Shutoff stop mV : 650...850

J16

J16

Setting values of injection pump
Check values in brackets

Supply pump pressure:
Speed 1/min : 1050
Checkbk. volt.
mV : 2860
Setting value, bar : 8.5...8.7

Timing device travel:
Speed 1/min : 1050
Checkbk. volt
mV : 2860
Setting value, mm : 11.6...12.6

Full-load delivery :
1st temperature-conditioning
revolution 1/min : 1500
Checkbk. volt
mV : 2250
Fuel delivery cm^3/
> 1000s : 23.2...23.6
Dispersion cm^3/ : 2.5
> 1000s :

Test specifications of injection pump
Check values in brackets

Supply pump pressure variations:

1st speed 1/min : 2000
Checkbk. volt
mV : 2915
Supply pump
pressure > bar : 9.6...10.6
> bar : (9.4...10.8)

2st speed 1/min : 1050
Checkbk. volt
mV : 2860
Supply pump
pressure > bar :
> bar : (7.9...9.3)

3st speed 1/min : 600
Checkbk. volt
mV : 2610
Supply pump
pressure > bar : 7.5...8.5
> bar : (7.3...8.7)

4st speed 1/min : 200
Checkbk. volt
mV : 2570
Supply pump
pressure > bar : 5.2...6.8
> bar : (4.9...7.1)

Timing device variations:

1st speed 1/min : 600
Checkbk. volt. mV : 2580
Timing device
travel mm : 10.6...12.6
> mm : (9.1...14.1)

2nd speed 1/min : 1050
Checkbk. volt. mV : 2860
Timing device
travel mm :
> mm : (11.3...12.9)

3rd speed 1/min : 1050
Checkbk. volt. mV : 1850
Timing device
travel mm : max. 0.4
> mm : (max. 0.6)
Solenoid valve
Start of
injection, volts : 12

4.th speed 1/min : 1500
Checkbk. volt. mV : 2960
Timing device
travel mm : 12.0...12.6
> mm : (11.3...13.3)

5.th speed 1/min : 2000
Checkbk. volt. mV : 2915
Timing device
travel mm : 11.9...12.7
> mm : (11.5...13.1)

6.th speed 1/min : 2200
Checkbk. volt. mV : 1620
Timing device
travel mm : max. 1.5
> mm : (max. 2.0)
Solenoid valve
Start of
injection, volts : 12

7.th speed 1/min : 600
Checkbk. volt. mV : 2580
Timing device
travel mm : 10.6...12.6
> mm : (9.1...13.1)

Overflow at overflow valve:

Speed 1/min : 2200
Checkbk. volt. mV : 2910
Overflow : 125...208
> cm^3/10s :

J17

Fuel delivery variations:

1. Speed	1/min	: 2000
Checkbk. volt	mV	: 2915
Fuel delivery	cm³/	: 51.0...54.4
>	1000s	: (50.2...55.2)
Dispersion	cm³/	: 2.5
>	1000s.	:
2. Speed	1/min	: 1600
Checkbk. volt	mV	: 2580
Fuel delivery	cm³/	: 37.2...39.6
>	1000s	: (36.4...40.4)
Dispersion	cm³/	: 2.0
>	1000s	:
3. Speed	1/min	: 1200
Checkbk. volt	mV	: 2980
Fuel delivery	cm³/	: 54.5...57.3
>	1000s	: (53.4...58.3)
Dispersion	cm³/	: 2.0
>	1000s	:
4. Speed	1/min	: 1200
Checkbk. volt	mV	: 2250
Fuel delivery	cm³/	:
>	1000s	: (21.6...25.2)
Dispersion	cm³/	:
>	1000s	: (3.0)
5. Speed	1/min	: 600
Checkbk. volt	mV	: 2610
Fuel delivery	cm³/	: 34.6...38.0
>	1000s	: (33.8...40.8)
Dispersion	cm³/	: 3.0
>	1000s	:

Idle delivery:

Speed	1/min	: 400
Checkbk. volt	mV	: 2190
Fuel delivery	cm³/	: 10.4...14.4
>	1000s	: (9.4...15.4)
Solenoid valve Start of injection, volts		: 12
Dispersion	cm³/	: 2.0
>	1000s	: (3.0)

Starting fuel delivery:

Speed	1/min	: 100
Checkbk. volt	mV	: 3550
Fuel delivery	cm³/	: 53.9...65.9
>	1000s	: (50.9...68.9)
Solenoid valve Start of injection, volts		: 12

Stop test:

Speed	1/min	: 1500
Checkbk. volt	mV	: 4000
ELAB	volts	: 0
Fuel delivery	cm³/	: 2.5
max.	1000s	:

Shutoff solenoid:

Cut-in voltage min.>	volts	: 10.0
Rated voltage,	volts	: 12.0

Dimensions for mounting and setting:

Description		
K	mm	:
KF	mm	:
SVS max.	mm	:
FH	mm	:

J18

J18

BOSCH INJECTION PUMP TEST SPECIFICATIONS

Obsereve notes in remark colum

Test sheet	: VW
Date of manufacture	:
Edition	: 08.10.1996
Replaces	:
Test oil	: ISO 4113
Injection pump	: VE4/10E2250R728
Type No.	: 0 460 404 966
Customer Ident.No.	:

Customer-specific details

Customer	: VW
Engine	: 1.9 SDI EDC
Output kW	:
Speed 1/min	:

TEST BENCH PREREQUISITES

Inlet pressure, bar	: 0.30...0.40
Calibrating nozzle-holder assembly >	: 1 688 901 114
Opening pressure > bar	: 207...210
Test pressure line	: 1 680 750 085
Outer diameter	: 6.00
x wall thickness >	: 2.20
x length > mm	: 350
Overflow valve	: 2 467 413 018
Test line (fuel-delivery actuator)	: 0 986 612 444
Test line (solenoid valve start of injection)	: 1 687 011 208 (Test cable set)

TEST PRECONDITIONS

Test oil return temp. > °C with thermometer	: 55
Test oil supply temperature > °C	: 42...47
Hold-up revolutions >1/min	: 1200
Feedback voltage mV	: 2500

ELECTRICAL TEST

Actuator
Connections 5 and 6
Test temperature:

15°...30°C, ohms	: 0.4...1.0
50°...70°C, ohms	: 0.45...1.1
Connections 5 and. ground, Mohms min.	: 1.0
Connections 6 and ground, Mohms min.	: 1.0
Connections 3 and 5 Mohms min.	: 1.0
Connections 6 and 7 Mohms min.	: 1.0

High-pressure compressor sensor
Sensor coils
Connections 1 and 2

Ohms	: 4.9...6.5
Connections 2 and 3 Ohms	: 4.9...6.5
Connections 1 and 3 Ohms	: 9.8...13.0
Connections 1 and. ground, Mohms min.	: 1.0
Connections 2 and ground, Mohms min.	: 1.0
Connections 3 and ground, Mohms min.	: 1.0

Temperature sensor, fuel
Connentions 4 and 7
Test temperature:

15°...30°C, kohms	: 1.2...4.0
50°...70°C, kohms	: 0.3...1.2
Connections 4 and ground, Mohms min.	: 1.0
Connections 7 and ground Mohms min.	: 1.0

Solenoid valve, start of injection
Connections 1 and 2
Test temperature :

15°...30°C, ohms	: 14.3...17.3
50°...70°C, ohms	: 15.5...21.0
Starting stop mV	: 4120...4650
Shutoff stop mV	: 650...850

J19

J19

Setting values of injection pump
Check values in brackets

Supply pump pressure:

Speed	1/min	: 500
Checkbk. volt. mV		: 2360
Setting value, bar		: 5.9...6.7

Timing device travel:

Speed	1/min	: 500
Checkbk. volt mV		: 2360
Setting value, mm		: 10.6...10.8

Full-load delivery :

1st temperature-conditioning revolution	1/min	: 2000
Checkbk. volt mV		: 2500
Output temperature °C		: 61
Speed	1/min	: 800
Checkbk. volt mV		: 2550
Measuring temperature °C		: 57
Fuel delivery	cm³/ 1000s	: 34.6...35.0
Dispersion >	cm³/ 1000s	: 2.5 :

Test specifications of injection pump
Check values in brackets

Supply pump pressure variations:

1st speed	1/min	: 2100
Checkbk. volt mV		: 3370
Supply pump pressure >	bar	: 8.4...9.6
>	bar	: (8.2...9.8)
2st speed	1/min	: 300
Checkbk. volt mV		: 2360
Supply pump pressure >	bar	: 5.3...6.7
>	bar	: (5.1...6.9)

Timing device variations:

1st speed	1/min	: 500
Checkbk. volt. mV		: 2360
Timing device travel	mm	:
>	mm	: (9.7...11.7)
2nd speed	1/min	: 2100
Checkbk. volt. mV		: 3370
Timing device travel	mm	: 11.8...12.6
>	mm	: (11.4...13.0)
3rd speed	1/min	: 2100
Checkbk. volt. mV		: 1400
Timing device travel	mm	: max. 3.2
>	mm	: (max. 4.0)
Solenoid valve Start of injection, volts		: 12
4.th speed	1/min	: 300
Checkbk. volt. mV		: 2360
Timing device travel	mm	: 8.6...11.0
>	mm	: (8.2...11.4)

Overflow at overflow valve:

1st temperature-conditioning revolution	1/min	: 100
Checkbk. volt. mV		: 2500
Output temperature °C		: 51
Speed	1/min	: 2100
Checkbk. volt. mV		: 3370
Measuring temperature °C		: 53
Overflow		: 111...167
>	cm³/10s	:

J20

J20

Fuel delivery variations:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt mV : 2500
Output
temperature °C : 51
Speed 1/min : 2100
Checkbk. volt mV : 3370
Meßtemperatur °C : 53
Fuel delivery cm³/ : 36.5...38.9
> 1000s : (35.9...39.5)
Dispersion cm³/ : 2.5
> 1000s. : (2.5)

2nd temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 800
Checkbk. volt mV : 2550
Measuring
temperature °C : 57
Fuel delivery cm³/ :
> 1000s : (33.5...36.1)
Dispersion cm³/ :
> 1000s : (2.5)

3rd temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 500
Checkbk. volt mV : 2360
Measuring
temperature °C : 57
Fuel delivery cm³/ : 35.6...38.6
> 1000s : (35.3...38.9)
Dispersion cm³/ : 3.0
> 1000s : (3.0)

Idle delivery:
1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 400
Checkbk. volt mV : 1640
Meßtemperatur °C : 57
Fuel delivery cm³/ : 6.5...10.5
> 1000s : (5.5...11.5)
Solenoid valve
Start of
injection, volts : 12
Dispersion cm³/ : 3.0
> 1000s : (4.0)

Starting fuel delivery:
1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 65
Speed 1/min : 100
Checkbk. volt mV : 2730
Measuring
temperature °C : 61
Fuel delivery cm³/ : 43.0...53.0
> 1000s : (40.0...56.0)
Solenoid valve
Start of
injection, volts : 12

Stop test:
Speed 1/min : 750
Checkbk. volt mV : 3650
ELAB volts : 0
Fuel delivery cm³/ :
max. 1000s : 3.0
Start of

Shutoff solenoid:
Cut-in voltage
min.> volts : 10.0
Rated voltage,
volts : 12.0

Notes:
High-pressure compressor sensor
Testing only possible with ballast
EPS 910

Take note of test instructions
"Distributor pump for direct
injectors"!

Dimensions for mounting and setting:

Description		
K	mm	:
KF	mm	: 6.2...6.6
SVS max.	mm	:
FH	mm	:
TS		: 1 467 010 410

J21

BOSCH INJECTION PUMP TEST SPECIFICATIONS

Obsereve notes in remark colum

Test sheet : VW
Date of manufacture :
Edition : 22.10.1996
Replaces :
Test oil : ISO 4113

Injection pump : VE4/10E2100R701-3

Type No. : 0 460 404 967
Customer Ident.No. :

Customer-specific details
Customer : VW

Engine : 1.7 SDI EDC

Output kW :
Speed 1/min :

TEST BENCH PREREQUISITES

Inlet pressure, bar : 0.30...0.40

Calibrating nozzle-
holder assembly > : 1 688 901 114

Opening
pressure > bar : 207...210

Test pressure line : 1 680 750 085

Outer diameter : 6.00
x wall thickness > : 2.20
x length > mm : 350

Overflow valve : 2 467 413 018

Test line : 0 986 612 444
(fuel-delivery actuator)

Test line : 1 687 011 208
(solenoid valve
start of injection): (Test cable set)

TEST PRECONDITIONS

Test oil
return temp. > °C
with thermometer : 55

Test oil supply
temperature > °C : 42...47

Hold-up
revolutions >1/min : 1200
Feedback
voltage mV : 2500

ELECTRICAL TEST

Actuator
Connections 5 and 6
Test temperature:
15°...30°C, ohms : 0.4...1.0
50°...70°C, ohms : 0.45...1.1

Connections 5 and.
ground, Mohms min. : 1.0
Connections 6 and
ground, Mohms min. : 1.0
Connections 3 and 5
Mohms min. : 1.0
Connections 6 and 7
Mohms min. : 1.0

High-pressure compressor sensor
Sensor coils
Connections 1 and 2
Ohms : 4.9...6.5
Connections 2 and 3
Ohms : 4.9...6.5
Connections 1 and 3
Ohms : 9.8...13.0

Connections 1 and.
ground, Mohms min. : 1.0
Connections 2 and
ground, Mohms min. : 1.0
Connections 3 and
ground, Mohms min. : 1.0

Temperature sensor, fuel
Connentions 4 and 7
Test temperature:
15°...30°C, kohms : 1.2...4.0
50°...70°C, kohms : 0.3...1.2

Connections 4 and
ground, Mohms min. : 1.0
Connections 7 and
ground Mohms min. : 1.0

Solenoid valve, start of injection
Connections 1 and 2
Test temperature :
15°...30°C, ohms : 14.3...17.3
50°...70°C, ohms : 15.5...21.0

Starting stop mV : 4120...4650

Shutoff stop mV : 650...850

J22

Setting values of injection pump
Check values in brackets

Supply pump pressure:
Speed 1/min : 500
Checkbk. volt.
mV : 2510
Setting value, bar : 7.8...8.6

Timing device travel:
Speed 1/min : 500
Checkbk. volt
mV : 2510
Setting value, mm : 9.6...9.8

Full-load delivery :
1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt
mV : 2500
Output
temperature °C : 61
Speed 1/min : 800
Checkbk. volt
mV : 2650
Measuring
temperature °C : 57
Fuel delivery cm^3/
> 1000s : 34.8...35.2
Dispersion cm^3/ : 2.5
> 1000s :

Test specifications of injection pump
Check values in brackets

Supply pump pressure variations:

1st speed 1/min : 2100
Checkbk. volt
mV : 3330
Supply pump
pressure > bar : 10.4...11.4
> bar :

2st speed 1/min : 300
Checkbk. volt
mV : 2510
Supply pump
pressure > bar : 6.8...8.2
> bar :

Timing device variations:

1st speed 1/min : 500
Checkbk. volt. mV : 2510
Timing device
travel mm :
> mm : (8.7...10.7)

2nd speed 1/min : 2100
Checkbk. volt. mV : 3330
Timing device
travel mm : 11.8...12.8
> mm : (11.5...13.1)

3rd speed 1/min : 2100
Checkbk. volt. mV : 1440
Timing device
travel mm : max. 3.0
> mm :
Solenoid valve
Start of
injection, volts : 12

4.th speed 1/min : 300
Checkbk. volt. mV : 2510
Timing device
travel mm : 6.5...10.5
> mm : (5.1...11.9)

Overflow at overflow valve:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt. mV : 2100
Output
temperature °C : 51
Speed 1/min : 2100
Checkbk. volt. mV : 3300
Measuring
temperature °C : 53
Overflow : 116...200
> cm^3/10s :

J23

J23

Fuel delivery variations:

1st temperature-conditioning		
revolution	1/min	: 100
Checkbk. volt	mV	: 2500
Output		
temperature	°C	: 51
Speed	1/min	: 2100
Checkbk. volt	mV	: 3330
Meßtemperatur	°C	: 53
Fuel delivery	cm³/	: 36.3...38.7
>	1000s	: (35.7...39.3)
Dispersion	cm³/	: 3.0
>	1000s.	:

2nd temperature-conditioning		
revolution	1/min	: 100
Checkbk. volt	mV	: 2500
Output		
temperature	°C	: 51
Speed	1/min	: 1100
Checkbk. volt	mV	: 2880
Measuring		
temperature	°C	: 53
Fuel delivery	cm³/	: 34.9...37.3
>	1000s	: (34.3...37.9)
Dispersion	cm³/	:
>	1000s	:

3rd temperature-conditioning		
revolution	1/min	: 2000
Checkbk. volt	mV	: 2500
Output		
temperature	°C	: 61
Speed	1/min	: 800
Checkbk. volt	mV	: 2650
Measuring		
temperature	°C	: 57
Fuel delivery	cm³/	:
>	1000s	: (33.7...36.3)
Dispersion	cm³/	:
>	1000s	: (2.5)

4th temperature-conditioning		
revolution	1/min	: 2000
Checkbk. volt	mV	: 2500
Output		
temperature	°C	: 61
Speed	1/min	: 500
Checkbk. volt	mV	: 2510
Measuring		
temperature	°C	: 57
Fuel delivery	cm³/	: 35.5...38.1
>	1000s	: (34.8...38.8)
Dispersion	cm³/	: 3.0
>	1000s	:

Idle delivery:		
1st temperature-conditioning		
revolution	1/min	: 2000
Checkbk. volt	mV	: 2500
Output		
temperature	°C	: 61
Speed	1/min	: 400
Checkbk. volt	mV	: 1820
Meßtemperatur	°C	: 57
Fuel delivery	cm³/	: 5.6...9.6
>	1000s	: (4.6...10.6)
Solenoid valve		
Start of		
injection, volts		: 12
Dispersion	cm³/	: 3.0
>	1000s	: (4.0)

Starting fuel delivery:		
1st temperature-conditioning		
revolution	1/min	: 2000
Checkbk. volt	mV	: 2500
Output		
temperature	°C	: 65
Speed	1/min	: 100
Checkbk. volt	mV	: 2820
Measuring		
temperature	°C	: 61
Fuel delivery	cm³/	: 43.0...53.0
>	1000s	: (40.0...56.0)
Solenoid valve		
Start of		
injection, volts		: 12

Stop test:		
Speed	1/min	: 1000
Checkbk. volt	mV	: 3330
ELAB	volts	: 0
Fuel delivery	cm³/	:
max.	1000s	: 3.0
Start of		

Shutoff solenoid:		
Cut-in voltage		
min.> volts		: 10.0
Rated voltage,		
	volts	: 12.0

Notes:
High-pressure compressor sensor
Testing only possible with ballast
EPS 910

Take note of test instructions
"Distributor pump for direct
injectors"!

Dimensions for mounting and setting:

Description		
K	mm	:
KF	mm	: 8.2...8.6
SVS max.	mm	:
FH	mm	:
TS		: 1 467 010 495

J24

J24

BOSCH INJECTION PUMP TEST SPECIFICATIONS

Obsereve notes in remark colum

Test sheet	: VW
Date of manufacture	:
Edition	: 11.10.1996
Replaces	:
Test oil	: ISO 4113
Injection pump	: VE4/10E2075R696-3
Type No.	: 0 460 404 968
Customer Ident.No.	:

Customer-specific details

Customer	: VW
Engine	: 1.9 TDI EDC
Output kW	:
Speed 1/min	:

TEST BENCH PREREQUISITES

Inlet pressure, bar	: 0.30...0.40
Calibrating nozzle-holder assembly >	: 1 688 901 114
Opening pressure > bar	: 207...210
Test pressure line	: 1 680 750 085
Outer diameter	: 6.00
x wall thickness >	: 2.20
x length > mm	: 350
Overflow valve	: 2 467 413 018
Test line (fuel-delivery actuator)	: 0 986 612 444
Test line (solenoid valve start of injection)	: 1 687 011 208 (Test cable set)

TEST PRECONDITIONS

Test oil return temp. > °C with thermometer	: 55
Test oil supply temperature > °C	: 42...47
Hold-up revolutions >1/min	: 1200
Feedback voltage mV	: 2500

ELECTRICAL TEST

Actuator
Connections 5 and 6
Test temperature:

15°...30°C, ohms	: 0.4...1.0
50°...70°C, ohms	: 0.45...1.1
Connections 5 and. ground, Mohms min.	: 1.0
Connections 6 and ground, Mohms min.	: 1.0
Connections 3 and 5 Mohms min.	: 1.0
Connections 6 and 7 Mohms min.	: 1.0

High-pressure compressor sensor
Sensor coils
Connections 1 and 2

Ohms	: 4.9...6.5
Connections 2 and 3 Ohms	4.9...6.5
Connections 1 and 3 Ohms	: 9.8...13.0
Connections 1 and. ground, Mohms min.	: 1.0
Connections 2 and ground, Mohms min.	: 1.0
Connections 3 and ground, Mohms min.	: 1.0

Temperature sensor, fuel
Connentions 4 and 7
Test temperature:

15°...30°C, kohms	: 1.2...4.0
50°...70°C, kohms	: 0.3...1.2
Connections 4 and ground, Mohms min.	: 1.0
Connections 7 and ground Mohms min.	: 1.0

Solenoid valve, start of injection
Connections 1 and 2
Test temperature :

15°...30°C, ohms	: 14.3...17.3
50°...70°C, ohms	: 15.5...21.0
Starting stop mV	: 4120...4650
Shutoff stop mV	: 650...850

K1

1.1

Setting values of injection pump
Check values in brackets

Supply pump pressure:
Speed 1/min : 500
Checkbk. volt.
mV : 2560
Setting valve, bar : 8.4...9.2

Timing device travel:
Speed 1/min : 500
Checkbk. volt
mV : 2510
Setting value, mm : 10.1...10.3

Full-load delivery :
1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt
mV : 2500
Output
temperature °C : 61
Speed 1/min : 750
Checkbk. volt
mV : 2480
Measuring
temperature °C : 57
Fuel delivery cm³/
> 1000s : 34.7...35.1
Dispersion cm³/ : 2.5
> 1000s :

Test specifications of injection pump
Check values in brackets

Supply pump pressure variations:

1st speed 1/min : 2100
Checkbk. volt
mV : 3890
Supply pump
pressure > bar : 10.9...11.9
> bar :

2st speed 1/min : 300
Checkbk. volt
mV : 2560
Supply pump
pressure > bar : 6.6...8.0
> bar :

Timing device variations:

1st speed 1/min : 500
Checkbk. volt. mV : 2510
Timing device
travel mm :
> mm : (9.2...11.2)

2nd speed 1/min : 2050
Checkbk. volt. mV : 3330
Timing device
travel mm : 11.8...12.8
> mm : (11.5...13.1)

3rd speed 1/min : 1500
Checkbk. volt. mV : 1500
Timing device
travel mm : max. 0.5
> mm : (max. 0.8)
Solenoid valve
Start of
injection, volts : 12

Overflow at overflow valve:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt. mV : 2500
Output
temperature °C : 51
Speed 1/min : 2050
Checkbk. volt. mV : 3890
Measuring
temperature °C : 53
Overflow : 121...208
> cm³/10s :

K2

Fuel delivery variations:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt mV : 2500
Output
temperature °C : 51
Speed 1/min : 2050
Checkbk. volt mV : 2490
Meßtemperatur °C :
Fuel delivery cm³/ : 51.5...51.9
> 1000s : (48,9...52.5)
Dispersion cm³/ : 3.0
> 1000s. :

2nd temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 750
Checkbk. volt mV : 2480
Measuring
temperature °C : 57
Fuel delivery cm³/ :
> 1000s : (33.6...36.2)
Dispersion cm³/ :
> 1000s : (2.5)

3rd temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 500
Checkbk. volt mV : 2560
Measuring
temperature °C : 57
Fuel delivery cm³/ : 41.9...44.5
> 1000s : (41.2...45.2)
Dispersion cm³/ : 3.0
> 1000s :

Idle delivery:
1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 400
Checkbk. volt mV : 1800
Meßtemperatur °C : 57
Fuel delivery cm³/ : 7.7...11.7
> 1000s : (6.7...12.7)
Solenoid valve
Start of
injection, volts : 12
Dispersion cm³/ : 3.0
> 1000s : (4.0)

Starting fuel delivery:
1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 65
Speed 1/min : 100
Checkbk. volt mV : 2420
Measuring
temperature °C : 61
Fuel delivery cm³/ : 35.7...45.7
> 1000s : (32.7...48.7)
Solenoid valve
Start of
injection, volts : 12

Stop test:
Speed 1/min : 1000
Checkbk. volt mV : 4000
ELAB volts : 0
Fuel delivery cm³/ :
max. 1000s : 3.0
Start of

Shutoff solenoid:
Cut-in voltage
min.> volts : 10.0
Rated voltage,
volts : 12.0

Notes:
High-pressure compressor sensor
Testing only possible with ballast
EPS 910

Take note of test instructions
"Distributor pump for direct
injectors"!

Dimensions for mounting and setting:

Description		
K	mm	:
KF	mm	: 8.2...8.6
SVS max.	mm	:
FH	mm	:
TS		: 1 467 010 495

K3

BOSCH INJECTION PUMP TEST SPECIFICATIONS

Obsereve notes in remark colum

Test sheet	: Audi
Date of manufacture	:
Edition	: 11.10.1996
Replaces	:
Test oil	: ISO 4113
Injection pump	: VE4/10E2075R638-3
Type No.	: 0 460 404 969
Customer Ident.No.	:

Customer-specific details

Customer	: Audi
Engine	: 1.9 TDI
Output kW	:
Speed 1/min	:

TEST BENCH PREREQUISITES

Inlet pressure, bar	: 0.30...0.40
Calibrating nozzle-holder assembly >	: 1 688 901 114
Opening pressure > bar	: 207...210
Test pressure line	: 1 680 750 085
Outer diameter	: 6.00
x wall thickness >	: 2.20
x length > mm	: 350
Overflow valve	: 2 467 413 018
Test line	: 0 986 612 439
(fuel-delivery actuator)	: (KDEP 1865/10)
Test line	: 0 986 611 983
Solenoid valve start of injection)	: (KDEP 1190)

TEST PRECONDITIONS

Test oil return temp. > °C with thermometer	: 55
Test oil supply temperature > °C	: 42...47
Hold-up revolutions >1/min	: 1200
Feedback voltage mV	: 2500

ELECTRICAL TEST

Actuator
Connections 5 and 6
Test temperature:

15°...30°C, ohms	: 0.4...1.0
50°...70°C, ohms	: 0.45...1.1
Connections 5 and. ground, Mohms min.	: 1.0
Connections 6 and ground, Mohms min.	: 1.0
Connections 3 and 5 Mohms min.	: 1.0
Connections 6 and 7 Mohms min.	: 1.0

High-pressure compressor sensor
Sensor coils
Connections 1 and 2

Ohms	: 4.9...6.5
Connections 2 and 3 Ohms	: 4.9...6.5
Connections 1 and 3 Ohms	: 9.8...13.0
Connections 1 and. ground, Mohms min.	: 1.0
Connections 2 and ground, Mohms min.	: 1.0
Connections 3 and ground, Mohms min.	: 1.0

Temperature sensor, fuel
Connentions 4 and 7
Test temperature:

15°...30°C, kohms	: 1.2...4.0
50°...70°C, kohms	: 0.3...1.2
Connections 4 and ground, Mohms min.	: 1.0
Connections 7 and ground Mohms min.	: 1.0

Solenoid valve, start of injection
Connections 1 and 2
Test temperature :

15°...30°C, ohms	: 14.3...17.3
50°...70°C, ohms	: 15.5...21.0
Starting stop mV	: 4120...4650
Shutoff stop mV	: 650...850

K4

k4

Setting values of injection pump
Check values in brackets

Supply pump pressure:
Speed 1/min : 500
Checkbk. volt.
mV : 2560
Setting value, bar : 8.4...9.2

Timing device travel:
Speed 1/min : 500
Checkbk. volt
mV : 2510
Setting value, mm : 10.1...10.3

Full-load delivery :
1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt
mV : 2500
Output
temperature °C : 61
Speed 1/min : 750
Checkbk. volt
mV : 2480
Measuring
temperature °C : 57
Fuel delivery cm³/
> 1000s : 34.7...35.1
Dispersion cm³/ : 2.5
> 1000s :

Test specifications of injection pump
Check values in brackets

Supply pump pressure variations:

1st speed 1/min : 2050
Checkbk. volt
mV : 3890
Supply pump
pressure > bar : 10.9...11.9
> bar :

2st speed 1/min : 300
Checkbk. volt
mV : 2560
Supply pump
pressure > bar : 6.6...8.0
> bar :

Timing device variations:

1st speed 1/min : 500
Checkbk. volt. mV : 2510
Timing device
travel mm :
> mm : (9.2...11.2)

2nd speed 1/min : 2050
Checkbk. volt. mV : 3330
Timing device
travel mm : 11.8...12.8
> mm : (11.5...13.1)

3rd speed 1/min : 1500
Checkbk. volt. mV : 1500
Timing device
travel mm : max. 0.5
> mm : (max. 0.8)
Solenoid valve
Start of
injection, volts : 12

Overflow at overflow valve:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt. mV : 2500
Output
temperature °C : 51
Speed 1/min : 2050
Checkbk. volt. mV : 3890
Measuring
temperature °C : 53
Overflow : 121...208
> cm³/10s :

K5

Fuel delivery variations:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt mV : 2500
Output
temperature °C : 51
Speed 1/min : 2050
Checkbk. volt mV : 3890
Meßtemperatur °C : 53
Fuel delivery cm³/ : 49.5...51.9
> 1000s : (48.9...52.5)
Dispersion cm³/ : 3.0
> 1000s. :

2nd temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 750
Checkbk. volt mV : 2480
Measuring
temperature °C : 57
Fuel delivery cm³/ :
> 1000s : (33.6...36.2)
Dispersion cm³/ :
> 1000s : (2.5)

3rd temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 500
Checkbk. volt mV : 2560
Measuring
temperature °C : 57
Fuel delivery cm³/ : 41.9...44.5
> 1000s : (41.2...45.2)
Dispersion cm³/ : 3.0
> 1000s :

Idle delivery:

1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 400
Checkbk. volt mV : 1800
Meßtemperatur °C : 57
Fuel delivery cm³/ : 7.7...11.7
> 1000s : (6.7...12.7)
Solenoid valve
Start of
injection, volts : 12
Dispersion cm³/ : 3.0
> 1000s : (4.0)

Starting fuel delivery:

1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 65
Speed 1/min : 100
Checkbk. volt mV : 2420
Measuring
temperature °C : 61
Fuel delivery cm³/ : 35.7...45.7
> 1000s : (32.7...48.7)
Solenoid valve
Start of
injection, volts : 12

Stop test:

Speed 1/min : 1000
Checkbk. volt mV : 4000
ELAB volts : 0
Fuel delivery cm³/ :
max. 1000s : 3.0

Shutoff solenoid:
Cut-in voltage
min.> volts : 10.0
Rated voltage,
volts : 12.0

K6

K6

Notes:
High-pressure compressor sensor
Testing only possible with ballast
EPS 910

Take note of test instructions
"Distributor pump for direct
injectors"!

Dimensions for mounting and setting:

Description		
K	mm	: 3.6...3.8
KF	mm	: 8.2...8.6
SVS max.	mm	:
FH	mm	:
TS		: 1 467 010 495

K7

k7

BOSCH INJECTION PUMP TEST SPECIFICATIONS

Obsereve notes in remark colum

Test sheet : VW
Date of manufacture :
Edition : 18.02.1997
Replaces :
Test oil : ISO 4113

Injection pump : VE4/10E2250R590-3

Type No. : 0 460 404 970
Customer Ident.No. :

Customer-specific details
Customer : VW

Engine : 1.9 TDI EDC

Output kW :
Speed 1/min :

TEST BENCH PREREQUISITES

Inlet pressure, bar : 0.30...0.40

Calibrating nozzle-
holder assembly > : 1 688 901 114

Opening
pressure > bar : 207...210

Test pressure line : 1 680 750 085

Outer diameter : 6.00
x wall thickness > : 2.20
x length > mm : 350

Overflow valve : 2 467 413 018

Test line : 0 986 612 439
(fuel-delivery
actuator) : (KDEP 1865/10)

Test line : 0 986 611 983
(solenoid valve
start of injection) : (KDEP 1190)

TEST PRECONDITIONS

Test oil
return temp. > °C
with thermometer : 55

Test oil supply
temperature > °C : 42...47

Hold-up
revolutions >1/min : 1200
Feedback
voltage mV : 2500

ELECTRICAL TEST

Actuator
Connections 5 and 6
Test temperature:
15°...30°C, ohms : 0.4...1.0
50°...70°C, ohms : 0.45...1.1

Connections 5 and.
ground, Mohms min. : 1.0
Connections 6 and
ground, Mohms min. : 1.0
Connections 3 and 5
Mohms min. : 1.0
Connections 6 and 7
Mohms min. : 1.0

High-pressure compressor sensor
Sensor coils
Connections 1 and 2
Ohms : 4.9...6.5
Connections 2 and 3
Ohms : 4.9...6.5
Connections 1 and 3
Ohms : 9.8...13.0

Connections 1 and.
ground, Mohms min. : 1.0
Connections 2 and
ground, Mohms min. : 1.0
Connections 3 and
ground, Mohms min. : 1.0

Temperature sensor, fuel
Connentions 4 and 7
Test temperature:
15°...30°C, kohms : 1.2...4.0
50°...70°C, kohms : 0.3...1.2

Connections 4 and
ground, Mohms min. : 1.0
Connections 7 and
ground Mohms min. : 1.0

Solenoid valve, start of injection
Connections 1 and 2
Test temperature :
15°...30°C, ohms : 14.3...17.3
50°...70°C, ohms : 15.5...21.0

Starting stop mV : 4120...4650

Shutoff stop mV : 650...850

K8

K8

Setting values of injection pump
Check values in brackets

Supply pump pressure:

Speed	1/min	: 500
Checkbk. volt. mV		: 2450
Setting value, bar		: 7.3...8.7

Timing device travel:

Speed	1/min	: 500
Checkbk. volt mV		: 2450
Setting value, mm		: 9.7...9.9

Full-load delivery :

1st temperature-conditioning revolution	1/min	: 2000
Checkbk. volt mV		: 2500
Output temperature °C		: 61
Speed	1/min	: 750
Checkbk. volt mV		: 2420
Measuring temperature °C		: 57
Fuel delivery	cm^3/ 1000s	: 37.2...37.6
Dispersion >	cm^3/ 1000s	: 2.5 :

Test specifications of injection pump
Check values in brackets

Supply pump pressure variations:

1st speed	1/min	: 2100
Checkbk. volt mV		: 4000
Supply pump pressure >	bar	: 9.7...11.1
>	bar	: (9.6...11.2)
2st speed	1/min	: 300
Checkbk. volt mV		: 2450
Supply pump pressure >	bar	: 6.6...8.1
>	bar	: (6.4...8.2)

Timing device variations:

1st speed	1/min	: 500
Checkbk. volt. mV		: 2450
Timing device travel	mm	:
>	mm	: (8.8...10.8)
2nd speed	1/min	: 2000
Checkbk. volt. mV		: 4000
Timing device travel	mm	: 11.2...12.9
>	mm	: (11.4...13.0)
3rd speed	1/min	: 2100
Checkbk. volt. mV		: 1310
Timing device travel	mm	: max. 0.5
>	mm	: (max. 0.8)
Solenoid valve Start of injection,	volts	: 12
4.th speed	1/min	: 300
Checkbk. volt. mV		: 2450
Timing device travel	mm	: 6.5...9.7
>	mm	: (6.1...10.1)

Overflow at overflow valve:

1st temperature-conditioning revolution	1/min	: 100
Checkbk. volt. mV		: 2500
Output temperature °C		: 51
Speed	1/min	: 2100
Checkbk. volt. mV		: 4000
Measuring temperature °C		: 53
Overflow		: 97...208
>	cm^3/10s	:

K9

Fuel delivery variations:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt mV : 2500
Output
temperature °C : 51
Speed 1/min : 2000
Checkbk. volt mV : 4000
Meßtemperatur °C : 53
Fuel delivery cm³/ : 54.2...57.2
> 1000s : (53.9...57.5)
Dispersion cm³/ : 2.5
> 1000s. : (2.5)

2nd temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 750
Checkbk. volt mV : 2420
Measuring
temperature °C : 57
Fuel delivery cm³/ :
> 1000s : (36.1...38.7)
Dispersion cm³/ :
> 1000s : (2.5)

3rd temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 500
Checkbk. volt mV : 2450
Measuring
temperature °C : 57
Fuel delivery cm³/ : 43.6...46.6
> 1000s : (42.8...47.4)
Dispersion cm³/ : 3.0
> 1000s : (3.0)

Idle delivery:
1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 400
Checkbk. volt mV : 1550
Meßtemperatur °C : 57
Fuel delivery cm³/ : 6.8...11.8
> 1000s : (6.3...12.3)
Solenoid valve
Start of
injection, volts : 12
Dispersion cm³/ : 4.0
> 1000s : (4.0)

Starting fuel delivery:
1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 65
Speed 1/min : 100
Checkbk. volt mV : 2310
Measuring
temperature °C : 61
Fuel delivery cm³/ : 36.0...48.0
> 1000s : (34.0...50.0)
Solenoid valve
Start of
injection, volts : 12

Stop test:
Speed 1/min : 750
Checkbk. volt mV : 3650
ELAB volts : 0
Fuel delivery cm³/ :
max. 1000s : 3.0
Start of

Shutoff solenoid:
Cut-in voltage
min.> volts : 10.0
Rated voltage,
volts : 12.0

Notes:
High-pressure compressor sensor
Testing only possible with ballast
EPS 910

Take note of test instructions
"Distributor pump for direct
injectors"!

Dimensions for mounting and setting:

Description		
K	mm	:
KF	mm	: 6.2...6.6
SVS max.	mm	:
FH	mm	:
TS		: 1 467 010 410

K10

K10

BOSCH INJECTION PUMP TEST SPECIFICATIONS

Obsereve notes in remark colum

Test sheet	: VW
Date of manufacture	:
Edition	: 28.10.1996
Replaces	:
Test oil	: ISO 4113
Injection pump	: VE4/10E2250R510-3
Type No.	: 0 460 404 971
Customer Ident.No.	:

Customer-specific details

Customer	: VW
Engine	: 1.9 TDI EDC
Output kW	:
Speed 1/min	:

TEST BENCH PREREQUISITES

Inlet pressure, bar	: 0.30...0.40
Calibrating nozzle-holder assembly >	: 1 688 901 114
Opening pressure > bar	: 207...210
Test pressure line	: 1 680 750 085
Outer diameter	: 6.00
x wall thickness >	: 2.20
x length > mm	: 350
Overflow valve	: 2 467 413 018
Test line	: 0 986 612 439
(fuel-delivery actuator)	: (KDEP 1865/10)
Test line	: 0 986 611 983
(solenoid valve start of injection)	: (KDEP 1190)

TEST PRECONDITIONS

Test oil return temp. > °C with thermometer	: 55
Test oil supply temperature > °C	: 42...47
Hold-up revolutions >1/min	: 1200
Feedback voltage mV	: 2500

ELECTRICAL TEST

Actuator
Connections 5 and 6
Test temperature:

15°...30°C, ohms	: 0.4...1.0
50°...70°C, ohms	: 0.45...1.1
Connections 5 and. ground, Mohms min.	: 1.0
Connections 6 and ground, Mohms min.	: 1.0
Connections 3 and 5 Mohms min.	: 1.0
Connections 6 and 7 Mohms min.	: 1.0

High-pressure compressor sensor
Sensor coils

Connections 1 and 2 Ohms	: 4.9...6.5
Connections 2 and 3 Ohms	: 4.9...6.5
Connections 1 and 3 Ohms	: 9.8...13.0
Connections 1 and. ground, Mohms min.	: 1.0
Connections 2 and ground, Mohms min.	: 1.0
Connections 3 and ground, Mohms min.	: 1.0

Temperature sensor, fuel
Connentions 4 and 7
Test temperature:

15°...30°C, kohms	: 1.2...4.0
50°...70°C, kohms	: 0.3...1.2
Connections 4 and ground, Mohms min.	: 1.0
Connections 7 and ground Mohms min.	: 1.0

Solenoid valve, start of injection
Connections 1 and 2
Test temperature :

15°...30°C, ohms	: 14.3...17.3
50°...70°C, ohms	: 15.5...21.0
Starting stop mV	: 4120...4650
Shutoff stop mV	: 650...850

K11

k11

Setting values of injection pump
Check values in brackets

Supply pump pressure:
Speed 1/min : 500
Checkbk. volt.
mV : 2245
Setting value, bar : 6.0...7.4

Timing device travel:
Speed 1/min : 500
Checkbk. volt
mV : 2245
Setting value, mm : 10.7...10.9

Full-load delivery :
1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt
mV : 2500
Output
temperature °C : 61
Speed 1/min : 750
Checkbk. volt
mV : 2480
Measuring
temperature °C : 57
Fuel delivery cm³/
> 1000s : 38.8...39.2
Dispersion cm³/ : 2.5
> 1000s :

Test specifications of injection pump
Check values in brackets

Supply pump pressure variations:

1st speed 1/min : 2000
Checkbk. volt
mV : 3890
Supply pump
pressure > bar : 8.2...9.6
> bar : (8.1...9.7)

2st speed 1/min : 150
Checkbk. volt
mV : 2230
Supply pump
pressure > bar : min. 3.5
> bar :

Timing device variations:

1st speed 1/min : 500
Checkbk. volt. mV : 2245
Timing device
travel mm :
> mm : (8.6...11.8)

2nd speed 1/min : 2000
Checkbk. volt. mV : 3890
Timing device
travel mm : 11.5...12.9
> mm : (11.6...13.0)

3rd speed 1/min : 1400
Checkbk. volt. mV : 1475
Timing device
travel mm : max. 0.5
> mm : (max. 0.8)
Solenoid valve
Start of
injection, volts : 12

4.th speed 1/min : 300
Checkbk. volt. mV : 2245
Timing device
travel mm : 8.8...11.6
> mm : (8.6...11.8)

Overflow at overflow valve:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt. mV : 2500
Output
temperature °C : 51
Speed 1/min : 2000
Checkbk. volt. mV : 3890
Measuring
temperature °C : 53
Overflow : 97...180
> cm³/10s :

K12

K12

Fuel delivery variations:

1st temperature-conditioning		
revolution	1/min	: 100
Checkbk. volt	mV	: 2500
Output		
temperature	°C	: 51
Speed	1/min	: 2000
Checkbk. volt	mV	: 3890
Meßtemperatur	°C	: 53
Fuel delivery	cm³/	: 48.2...51.2
>	1000s	: (47.9...51.5)
Dispersion	cm³/	: 2.5
>	1000s.	: (2.5)
2nd temperature-conditioning		
revolution	1/min	: 2000
Checkbk. volt	mV	: 2500
Output		
temperature	°C	: 61
Speed	1/min	: 750
Checkbk. volt	mV	: 2480
Measuring		
temperature	°C	: 57
Fuel delivery	cm³/	:
>	1000s	: (37.7...40.3)
Dispersion	cm³/	:
>	1000s	: (2.5)
3rd temperature-conditioning		
revolution	1/min	: 2000
Checkbk. volt	mV	: 2500
Output		
temperature	°C	: 61
Speed	1/min	: 500
Checkbk. volt	mV	: 2245
Measuring		
temperature	°C	: 57
Fuel delivery	cm³/	: 36.8...39.8
>	1000s	: (36.0...40.6)
Dispersion	cm³/	: 3.0
>	1000s	: (3.0)

Idle delivery:		
1st temperature-conditioning		
revolution	1/min	: 2000
Checkbk. volt	mV	: 2500
Output		
temperature	°C	: 61
Speed	1/min	: 500
Checkbk. volt	mV	: 1600
Meßtemperatur	°C	: 57
Fuel delivery	cm³/	: 11.7...17.3
>	1000s	: (11.5...17.5)
Solenoid valve		
Start of		
injection, volts		: 12
Dispersion	cm³/	: 3.0
>	1000s	: (4.0)
Starting fuel delivery:		
1st temperature-conditioning		
revolution	1/min	: 2000
Checkbk. volt	mV	: 2500
Output		
temperature	°C	: 65
Speed	1/min	: 100
Checkbk. volt	mV	: 2230
Measuring		
temperature	°C	: 61
Fuel delivery	cm³/	: 30.5...42.5
>	1000s	: (28.5...44.5)
Solenoid valve		
Start of		
injection, volts		: 12
Stop test:		
Speed	1/min	: 750
Checkbk. volt	mV	: 2480
ELAB	volts	: 0
Fuel delivery	cm³/	:
max.	1000s	: 3.0
Start of		
Shutoff solenoid:		
Cut-in voltage		
min.> volts		: 10.0
Rated voltage,		
	volts	: 12.0

Notes:
High-pressure compressor sensor
Testing only possible with ballast
EPS 910

Take note of test instructions
"Distributor pump for direct
injectors"!

Dimensions for mounting and setting:

Description		
K	mm	:
KF	mm	: 6.2...6.6
SVS max.	mm	:
FH	mm	:
TS		: 1 467 010 410

K13

K 13

BOSCH INJECTION PUMP TEST SPECIFICATIONS

Obsereve notes in remark colum

Test sheet : Skoda
Date of manufacture :
Edition : 03.03.1997
Replaces :
Test oil : ISO 4113

Injection pump : VE4/10E2100R724

Type No. : 0 460 404 972
Customer Ident.No. :

Customer-specific details
Customer : Skoda

Engine : 1.9 SDI EDC

Output kW :
Speed 1/min :

TEST BENCH PREREQUISITES

Inlet pressure, bar : 0.30...0.40

Calibrating nozzle-
holder assembly > : 1 688 901 114

Opening
pressure > bar : 207...210

Test pressure line : 1 680 750 085

Outer diameter : 6.00
x wall thickness > : 2.20
x length > mm : 350

Overflow valve : 2 467 413 018

Test line : 0 986 612 444
(fuel-delivery actuator)

Test line : 1 687 011 208
(solenoid valve
start of injection) : (Test cable set)

TEST PRECONDITIONS

Test oil
return temp. > °C
with thermometer : 55

Test oil supply
temperature > °C : 42...47

Hold-up
revolutions >1/min : 1200
Feedback
voltage mV : 2500

ELECTRICAL TEST

Actuator
Connections 5 and 6
Test temperature:
15°...30°C, ohms : 0.4...1.0
50°...70°C, ohms : 0.45...1.1

Connections 5 and.
ground, Mohms min. : 1.0
Connections 6 and
ground, Mohms min. : 1.0
Connections 3 and 5
Mohms min. : 1.0
Connections 6 and 7
Mohms min. : 1.0

High-pressure compressor sensor
Sensor coils
Connections 1 and 2
Ohms : 4.9...6.5
Connections 2 and 3
Ohms : 4.9...6.5
Connections 1 and 3
Ohms : 9.8...13.0

Connections 1 and.
ground, Mohms min. : 1.0
Connections 2 and
ground, Mohms min. : 1.0
Connections 3 and
ground, Mohms min. : 1.0

Temperature sensor, fuel
Connentions 4 and 7
Test temperature:
15°...30°C, kohms : 1.2...4.0
50°...70°C, kohms : 0.3...1.2

Connections 4 and
ground, Mohms min. : 1.0
Connections 7 and
ground Mohms min. : 1.0

Solenoid valve, start of injection
Connections 1 and 2
Test temperature :
15°...30°C, ohms : 14.3...17.3
50°...70°C, ohms : 15.5...21.0

Starting stop mV : 4120...4650

Shutoff stop mV : 650...850

K14

K14

Setting values of injection pump
Check values in brackets

Supply pump pressure:
Speed 1/min : 500
Checkbk. volt.
mV : 2510
Setting value, bar : 7.3...8.7

Timing device travel:
Speed 1/min : 500
Checkbk. volt
mV : 2510
Setting value, mm : 9.7...9.9

Full-load delivery :
1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt
mV : 2500
Output
temperature °C : 61
Speed 1/min : 800
Checkbk. volt
mV : 2650
Measuring
temperature °C : 57
Fuel delivery cm^3/
> 1000s : 36.2...36.6
Dispersion cm^3/ : 2.5
> 1000s :

Test specifications of injection pump
Check values in brackets

Supply pump pressure variations:

1st speed 1/min : 2100
Checkbk. volt
mV : 3330
Supply pump
pressure > bar : 10.0...11.4
> bar :

2st speed 1/min : 300
Checkbk. volt
mV : 2510
Supply pump
pressure > bar : 6.3...8.7
> bar :

Timing device variations:

1st speed 1/min : 500
Checkbk. volt. mV : 2510
Timing device
travel mm :
> mm : (8.8...10.8)

2nd speed 1/min : 2100
Checkbk. volt. mV : 3330
Timing device
travel mm : 11.6...13.0
> mm : (11.5...13.1)

3rd speed 1/min : 2100
Checkbk. volt. mV : 1600
Timing device
travel mm : max. 3.0
> mm : (max. 3.0)
Solenoid valve
Start of
injection, volts : 12

4.th speed 1/min : 300
Checkbk. volt. mV : 2510
Timing device
travel mm : 6.0...11.0
> mm : (5.1...11.9)

Overflow at overflow valve:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt. mV : 2500
Output
temperature °C : 51
Speed 1/min : 2100
Checkbk. volt. mV : 3330
Measuring
temperature °C : 53
Overflow : 125...208
> cm^3/10s :

K15

Fuel delivery variations:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt mV : 2500
Output
temperature °C : 51
Speed 1/min : 2100
Checkbk. volt mV : 3330
Meßtemperatur °C : 53
Fuel delivery cm³/ : 36.3...39.3
> 1000s : (36.0...39.6)
Dispersion cm³/ : 3.0
> 1000s. : (3.0)

2nd temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 800
Checkbk. volt mV : 2550
Measuring
temperature °C : 57
Fuel delivery cm³/ :
> 1000s : (35.1...37.7)
Dispersion cm³/ :
> 1000s : (2.5)

3rd temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 500
Checkbk. volt mV : 2510
Measuring
temperature °C : 57
Fuel delivery cm³/ : 36.9...39.9
> 1000s : (36.4...40.4)
Dispersion cm³/ : 3.0
> 1000s : (3.0)

Idle delivery:
1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 400
Checkbk. volt mV : 1820
Meßtemperatur °C : 57
Fuel delivery cm³/ : 7.3...12.3
> 1000s : (6.8...12.8)
Solenoid valve
Start of
injection, volts : 12
Dispersion cm³/ : 3.0
> 1000s : (4.0)

Starting fuel delivery:
1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 65
Speed 1/min : 100
Checkbk. volt mV : 2820
Measuring
temperature °C : 61
Fuel delivery cm³/ : 42.0...56.0
> 1000s : (41.0...57.0)
Solenoid valve
Start of
injection, volts : 12

Stop test:
Speed 1/min : 1000
Checkbk. volt mV : 3330
ELAB volts : 0
Fuel delivery cm³/ :
max. 1000s : 3.0
Start of

Shutoff solenoid:
Cut-in voltage
min.> volts : 10.0
Rated voltage,
volts : 12.0

Notes:
High-pressure compressor sensor
Testing only possible with ballast
EPS 910

Take note of test instructions
"Distributor pump for direct
injectors"!

Dimensions for mounting and setting:

Description
K mm :
KF mm : 8.2...8.6
SVS max. mm :
FH mm :
TS : 1 467 010 495

K16

k 16

BOSCH INJECTION PUMP TEST SPECIFICATIONS

Obsereve notes in remark colum

Test sheet : ROW
Date of manufacture :
Edition : 06.12.1996
Replaces :
Test oil : ISO 4113

Injection pump : VE4/10E2100L720

Type No. : 0 460 404 973
Customer Ident.No. :

Customer-specific details
Customer : ROW

Engine : TCIE Job 3

Output kW :
Speed 1/min :

TEST BENCH PREREQUISITES

Inlet pressure, bar : 0.30...0.40

Calibrating nozzle-
holder assembly > : 1 688 901 114

Opening
pressure > bar : 207...210

Test pressure line : 1 680 750 085

Outer diameter : 6.00
x wall thickness > : 2.20
x length > mm : 350

Overflow valve : 0 986 612 437

Test line :
(fuel-delivery actuator)

Test line : 0 986 611 438
(solenoid valve
start of injection)

TEST PRECONDITIONS

Test oil
return temp. > °C
with thermometer : 55

Test oil supply
temperature > °C : 42...47

Hold-up
revolutions >1/min : 1200
Feedback
voltage mV : 2500

ELECTRICAL TEST

Actuator
Connections 5 and 6
Test temperature:
15°...30°C, ohms : 0.4...1.0
50°...70°C, ohms : 0.45...1.1

Connections 5 and.
ground, Mohms min. : 1.0
Connections 6 and
ground, Mohms min. : 1.0
Connections 3 and 5
Mohms min. : 1.0
Connections 6 and 7
Mohms min. : 1.0

High-pressure compressor sensor
Sensor coils
Connections 1 and 2
Ohm : 4.9...6.5
Connections 2 and 3
Ohm : 4.9...6.5
Connections 1 and 3
Ohm : 9.8...13.0

Connections 1 and.
ground, Mohms min. : 1.0
Connections 2 and
ground, Mohms min. : 1.0
Connections 3 and
ground, Mohms min. : 1.0

Temperature sensor, fuel
Connentions 4 and 7
Test temperature:
15°...30°C, kohms : 1.2...4,0
50°...70°C, kohms : 0.3...1.2

Connections 4 and
ground, Mohms min. : 1.0
Connections 7 and
ground Mohms min. : 1.0

Solenoid valve, start of injection
Connections 1 and 2
Test temperature :
15°...30°C, ohms : 14.3...17.3
50°...70°C, ohms : 15.5...21.0

Starting stop mV : 4120...4650

Shutoff stop mV : 650...850

K17

Setting values of injection pump
Check values in brackets

Supply pump pressure:
Speed 1/min : 700
Checkbk. volt.
mV : 2200
Setting value, bar : 8.1...9.5

Timing device travel:
Speed 1/min : 700
Checkbk. volt
mV : 2200
Setting value, mm : 10.6...10.8

Full-load delivery :
1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt
mV : 2500
Output
temperature °C : 61
Speed 1/min : 700
Checkbk. volt
mV : 2200
Measuring
temperature °C : 57
Fuel delivery cm^3/
> 1000s : 29.2...30.2
Dispersion cm^3/ : 2.5
> 1000s :

Test specifications of injection pump
Check values in brackets

Supply pump pressure variations:

1st speed 1/min : 2000
Checkbk. volt
mV : 3880
Supply pump
pressure > bar : 10.0...11.4
> bar :

2st speed 1/min : 300
Checkbk. volt
mV : 2420
Supply pump
pressure > bar : 6.2...8.6
> bar :

Timing device variations:

1st speed 1/min : 400
Checkbk. volt. mV : 2420
Timing device
travel mm : 7.9...11.5
> mm : (7.2...12.2)

2nd speed 1/min : 2100
Checkbk. volt. mV : 3880
Timing device
travel mm : 11.8...12.8
> mm : (11.7...12.9)

3rd speed 1/min : 1500
Checkbk. volt. mV : 1460
Timing device
travel mm : max. 1.0
> mm : (max. 1.5)
Solenoid valve
Start of
injection, volts : 12

4.th speed 1/min : 700
Checkbk. volt. mV : 2200
Timing device
travel mm :
> mm : (9.7...11.7)

Overflow at overflow valve:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt. mV : 2500
Output
temperature °C : 51
Speed 1/min : 2000
Checkbk. volt. mV : 3880
Measuring
temperature °C : 53
Overflow : 111...194
> cm^3/10 :

K18

Fuel delivery variations:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt mV : 2500
Output
temperature °C : 51
Speed 1/min : 2100
Checkbk. volt mV : 3880
Meßtemperatur °C : 53
Fuel delivery cm³/ : 52.9...55.9
> 1000s : (52.4...56.4)
Dispersion cm³/ : 2.5
> 1000s. : (3.0)

2nd temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 60
Speed 1/min : 700
Checkbk. volt mV : 2200
Measuring
temperature °C : 56
Fuel delivery cm³/ :
> 1000s : (28.5...31.5)
Dispersion cm³/ :
> 1000s : (3.0)

3rd temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 500
Checkbk. volt mV : 2420
Measuring
temperature °C : 57
Fuel delivery cm³/ : 41.4...44.4
> 1000s : (40.9...44.9)
Dispersion cm³/ : 3.0
> 1000s : (3.0)

Idle delivery:
1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 450
Checkbk. volt mV : 1950
Meßtemperatur °C : 57
Fuel delivery cm³/ : 18.0...23.0
> 1000s : (17.5...23.5)
Dispersion cm³/ : 3.0
> 1000s. : (4.0)

Solenoid valve
Start of
injection, volts : 12
Dispersion cm³/ : 4.0
> 1000s :

Starting fuel delivery:
1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 65
Speed 1/min : 100
Checkbk. volt mV : 2570
Measuring
temperature °C : 61
Fuel delivery cm³/ : 44.0...60.0
> 1000s : (41.0...63.0)
Solenoid valve
Start of
injection, volts : 12

Stop test:
Speed 1/min : 1000
Checkbk. volt mV : 2250
ELAB volts : 0
Fuel delivery cm³/ :
max. 1000s : 3.0

Shutoff solenoid:
Cut-in voltage
min.> volts : 10.0
Rated voltage,
volts : 12.0

K19

K19

Notes:
High-pressure compressor sensor
Testing only possible with ballast
EPS 910

Take note of test instructions
"Distributor pump for direct
injectors"!

Dimensions for mounting and setting:

Description		
K	mm	: 3,6..3,8
KF	mm	:
SVS max.	mm	:
FH	mm	:
TS		: 2 467 010 004

K20

BOSCH INJECTION PUMP TEST SPECIFICATIONS

Obsereve notes in remark colum

Test sheet : Nissan
Date of manufacture :
Edition : 02.10.1996
Replaces :
Test oil : ISO 4113

Injection pump : VE4/10E2100L715

Type No. : 0 460 404 974
Customer Ident.No. :

Customer-specific details
Customer : Nissan

Engine : TD 27 Ti

Output kW :
Speed 1/min :

TEST BENCH PREREQUISITES

Inlet pressure, bar : 0.30...0.40

Calibrating nozzle-
holder assembly > : 1 688 901 022

Opening
pressure > bar : 130...133

Test pressure line : 1 680 750 073

Outer diameter : 6.00
x wall thickness > : 2.00
x length > mm : 450

Overflow valve :

Overflow valve :

Test line : 0 986 612 442
(fuel-delivery actuator)

Test line : 1 687 011 208
(solenoid valve
start of injection) : (Test cable set)

ELECTRICAL TEST

Actuator
Connections 4 and 7
Test temperature:
15°...30°C, ohms : 0.4...1.0
50°...70°C, ohms : 0.45...1.1

Connections 4 and.
ground, Mohms min. : 1.0
Connections 7 and
ground, Mohms min. : 1.0
Connections 2 and 7
Mohms min. : 1.0
Connections 4 and 6
Mohms min. : 1.0

High-pressure compressor sensor
Sensor coils
Connections 1 and 3
ohms : 4.9...6.5
Connections 2 and 3
ohms : 4.9...6.5
Connections 1 and 2
ohms : 9.8...13.0

Connections 1 and.
ground, Mohms min. : 1.0
Connections 2 and
ground, Mohms min. : 1.0
Connections 3 and
ground, Mohms min. : 1.0

Temperature sensor, fuel
Connentions 5 and 6
Test temperature:
15°...30°C, kohms : 1.2...4.0
50°...70°C, kohms : 0.3...1.2

Connections 5 and
ground, Mohms min. : 1.0
Connections 6 and
ground Mohms min. : 1.0

Solenoid valve, start of injection
Connections 1 and 2
Test temperature :
15°...30°C, ohms : 14.3...17.3
50°...70°C, ohms : 15.5...21.0

Starting stop mV : 4120...4650

Shutoff stop mV : 650...850

K21

V21

Setting values of injection pump
Check values in brackets

Supply pump pressure:
Speed 1/min : 1050
Checkbk. volt.
mV : 3080
Setting value, bar : 7.5...8.3

Timing device travel:
Speed 1/min : 1050
Checkbk. volt
mV : 3080
Setting value, mm : 10.7...10.9

Full-load delivery :
Speed 1/min : 1250
Checkbk. volt
mV : 2170
Fuel delivery cm³/
> 1000s : 28.3...28.7
Dispersion cm³/ : 2.5
> 1000s :

Test specifications of injection pump
Check values in brackets

Supply pump pressure variations:

1st speed 1/min : 2200
Checkbk. volt
mV : 2810
Supply pump
pressure > bar : 9.4...10.8
> bar : (9.4...10.8)

2st speed 1/min : 1050
Checkbk. volt
mV : 3080
Supply pump
pressure > bar :
> bar : (7.2...8.6)

3st speed 1/min : 500
Checkbk. volt
mV : 2640
Supply pump
pressure > bar : 6.7...7.7
> bar : (6.4...8.0)

Timing device variations:

1st speed 1/min : 500
Checkbk. volt. mV : 2640
Timing device
travel mm : 6.6...10.4
> mm : (6.1...11.1)

3rd speed 1/min : 1050
Checkbk. volt. mV : 1750
Timing device
travel mm : max. 0.4
> mm : (max. 0.6)
Solenoid valve
Start of
injection, volts : 12

4nd speed 1/min : 2200
Checkbk. volt. mV : 2810
Timing device
travel mm : 11,7...12,9
> mm : (11,5...13,1)

Overflow at overflow valve:

Speed 1/min : 2200
Checkbk. volt. mV : 2810
Overflow : 111...222
> cm³/10s :

K22

Fuel delivery variations:

1. Speed	1/min	: 2200
Checkbk. volt	mV	: 2810
Fuel delivery	cm³/	: 54.1...56.7
>	1000s	: (52.9...57.9)
Dispersion	cm³/	: 2.5
>	1000s.	:
2. Speed	1/min	: 1250
Checkbk. volt	mV	: 2170
Fuel delivery	cm³/	:
>	1000s	: (26.7...30.3)
Dispersion	cm³/	:
>	1000s	:
3. Speed	1/min	: 500
Checkbk. volt	mV	: 2640
Fuel delivery	cm³/	: 48.3...52.1
>	1000s	: (47.7...52.7)
Dispersion	cm³/	:
>	1000s	:

Idle delivery:

Speed	1/min	: 400
Checkbk. volt	mV	: 1870
Fuel delivery	cm³/	: 7.0...11.6
>	1000s	: (6.3...12.3)
Solenoid valve Start of injection, volts		: 12
Dispersion	cm³/	: 2.0
>	1000s	: (3.0)

Starting fuel delivery:

Speed	1/min	: 100
Checkbk. volt	mV	: 3300
Fuel delivery	cm³/	: 69.5...81.5
>	1000s	: (66.5...84.5)
Solenoid valve Start of injection, volts		: 12

Stop test:

Speed	1/min	: 1500
Checkbk. volt	mV	: 4000
ELAB	volts	: 0
Fuel delivery	cm³/	: max. 3.0
max.	1000s	: (max. 3.0)

Shutoff solenoid:

Cut-in voltage min.> volts		: 10.0
Rated voltage,	volts	: 12.0

Dimensions for mounting and setting:

Description		
K	mm	:
KF	mm	:
SVS max.	mm	:
FH	mm	:

K23

K23

BOSCH INJECTION PUMP TEST SPECIFICATIONS

Observe notes in remark colum

Test sheet	: BMW
Date of manufacture	:
Edition	: 29.09.1993
Replaces	:
Test oil	: ISO 4113
Injection pump	: VE6/10E2400R575
Type No.	: 0 460 406 993
Customer Ident.No.	:

Customer-specific details

Customer	: BMW
Engine	: M51
Output kW	:
Speed 1/min	:

TEST BENCH PREREQUISITES

Inlet pressure, bar	: 0.30...0.40
Calibrating nozzle-holder assembly >	: 1 688 901 022
Opening pressure > bar	: 130...133
Test pressure line	: 1 680 750 073
Outer diameter	: 6.00
x wall thickness >	: 2.00
x length > mm	: 450
Test line (fuel-delivery actuator)	: 0 986 612 430
Test line (solenoid valve start of injection)	: 0 986 612 435

ELECTRICAL TEST

Actuator
Connections 4 and 7
Test temperature:

15°...30°C, ohms	: 0.4...1.0
50°...70°C, ohms	: 0.45...1.1
Connections 4 and. ground, Mohms min.	: 1.0
Connections 7 and ground, Mohms min.	: 1.0
Connections 2 and 7 Mohms min.	: 1.0
Connections 4 and 6 Mohms min.	: 1.0

Control-collar travel sensor

Test temperature 15°...70°C	:
Connections 1 and 3 kohms	: 0,5...2,0
Connections 2 and 3 kohms	: 1,0...3,0
Connections 1 and. ground, Mohms min.	: 1.0
Connections 2 and ground, Mohms min.	: 1.0
Connections 3 and ground, Mohms min.	: 1.0

Temperature sensor, fuel
Connentions 5 and 6
Test temperature:

15°...30°C, kohms	: 1.2...4.0
50°...70°C, kohms	: 0.3...1.2
Connections 5 and ground, Mohms min.	: 1.0
Connections 6 and ground Mohms min.	: 1.0

Solenoid valve, start of injection
Connections 1 and 2

Test temperature 15°...30°C, ohms	: 14.3...17.3
50°...70°C, ohms	: 15.5...21.0
Starting stop mV	: 4120...4650
Shutoff stop mV	: 650...850

K24

Setting values of injection pump
Check values in brackets

Supply pump pressure:
Speed 1/min : 1500
Checkbk. volt.
mV : 3000
Setting value, bar : 7.2...7.8

Timing device travel:
Speed 1/min : 1500
Checkbk. volt
mV : 3000
Setting value, mm : 8.4...8.8

Full-load delivery :
1st temperature-conditioning
revolution 1/min : 1500
Checkbk. volt
mV : 3000
Fuel delivery cm^3/
> 1000s : 44.4...44.8
Dispersion cm^3/ : 2.0
> 1000s :

Test specifications of injection pump
Check values in brackets

Supply pump pressure variations:

1st speed 1/min : 2400
Checkbk. volt
mV : 3000
Supply pump
pressure > bar : 8.6...9.4
> bar : (8.8...9.5)

2st speed 1/min : 350
Checkbk. volt
mV : 3850
Supply pump
pressure > bar : 5.6...6.2
> bar : (5.4...6.4)

Timing device variations:

1st speed 1/min : 350
Checkbk. volt. mV : 3850
Timing device
travel mm : 5.0...6.4
> mm : (4.7...6.7)

2nd speed 1/min : 1500
Checkbk. volt. mV : 3000
Timing device
travel mm :
> mm : (7.9...9.3)

3rd speed 1/min : 1500
Checkbk. volt. mV : 3000
Timing device
travel mm : 0.0...0.4
> mm :
Solenoid valve
Start of
injection, volts : 12

4.th speed 1/min : 2300
Checkbk. volt. mV : 3000
Timing device
travel mm : 9.5...10.1
> mm : (9.3...10.3)
5.th speed 1/min : 150
Checkbk. volt. mV : 3850
Timing device
travel mm : 2.7...5.1
> mm : (1.9...5.9)

Overflow at overflow valve:

Speed 1/min : 2400
Checkbk. volt. mV : 3000
Overflow : 69...180
> cm^3/10s :

Fuel delivery variations:

1. Speed	1/min	: 2400
Checkbk. volt	mV	: 3000
Fuel delivery	cm³/	: 44.8...46.8
>	1000s	: (43.3...48.3)
Dispersion	cm³/	: 2.5
>	1000s.	: (2.5)
2. Speed	1/min	: 1500
Checkbk. volt	mV	: 3000
Fuel delivery	cm³/	:
>	1000s	: (42.8...46.4)
Dispersion	cm³/	:
>	1000s	: (2.0)
3. Speed	1/min	: 1000
Checkbk. volt	mV	: 3100
Fuel delivery	cm³/	: 45.9...47.9
>	1000s	: (44.4...52.4)
Dispersion	cm³/	: 2.0
>	1000s	: (2.0)
4. Speed	1/min	: 1000
Checkbk. volt	mV	: 2350
Fuel delivery	cm³/	: 13.3...14.5
>	1000s	: (11.6...16.2)
Dispersion	cm³/	: 2.0
>	1000s	: (2.0)
5. Speed	1/min	: 500
Checkbk. volt	mV	: 3000
Fuel delivery	cm³/	: 30.2...32.2
>	1000s	: (28.7...37.7)
Dispersion	cm³/	: 2.0
>	1000s	: (2.0)

Idle delivery:

Speed	1/min	: 350
Checkbk. volt	mV	: 2600
Fuel delivery	cm³/	: 7.0...9.0
>	1000s	: (5.5...10.5)
Solenoid valve Start of injection, volts		: 12
Dispersion	cm³/	: 2.0
>	1000s	: (2.0)

Starting fuel delivery:

Speed	1/min	: 100
Checkbk. volt	mV	: 3680
Fuel delivery	cm³/	: 33.0...45.0
>	1000s	: (30.0...48.0)
Solenoid valve Dispersion	cm³/	:
>	1000s	:
Start of injection, volts		: 12

Stop test:

Speed	1/min	: 2400
Checkbk. volt	mV	: 3000
ELAB	volts	: 0
Fuel delivery max.	cm³/ 1000s	: 3.0

Shutoff solenoid:

Cut-in voltage min.> volts	: 10.0
Rated voltage, volts	: 12.0

Dimensions for mounting and setting:

Description		
K	mm	:
KF	mm	:
SVS max.	mm	:
FH	mm	:
Prestroke..	mm	: 0,28...0,32
		: (0,26...0,34)

L2

L2

BOSCH INJECTION PUMP TEST SPECIFICATIONS

Obsereve notes in remark colum

Test sheet	: BMW
Date of manufacture	:
Edition	: 15.10.1996
Replaces	:
Test oil	: ISO 4113
Injection pump	: VE6/10E2200R515
Type No.	: 0 460 406 994
Customer Ident.No.	:

Customer-specific details

Customer	: BMW
Engine	: M51
Output kW	:
Speed 1/min	:

TEST BENCH PREREQUISITES

Inlet pressure, bar	: 0.30...0.40
Calibrating nozzle-holder assembly >	: 1 688 901 022
Opening pressure > bar	: 130...133
Test pressure line	: 1 680 750 073
Outer diameter	: 6,00
x wall thickness >	: 2.00
x length > mm	: 450
Overflow valve	:
Test line (fuel-delivery actuator)	: 0 986 612 430
Test line (solenoid valve start of injection)	: 0 986 612 435

ELECTRICAL TEST

Actuator
Connections 4 and 7
Test temperature:

15°...30°C, ohms	: 0.4...1.0
50°...70°C, ohms	: 0.45...1.1
Connections 4 and. ground, Mohms min.	: 1.0
Connections 7 and ground, Mohms min.	: 1.0
Connections 2 and 7 Mohms min.	: 1.0
Connections 4 and 6 Mohms min.	: 1.0

High-pressure compressor sensor
Sensor coils

Connections 1 and 3 kohms	: 4.9...6.5
Connections 2 and 3 kohms	: 4.9...6.5
Connections 1 and 2 kohms	: 9.8...13.0
Connections 1 and. ground, Mohms min.	: 1.0
Connections 2 and ground, Mohms min.	: 1.0
Connections 3 and ground, Mohms min.	: 1.0

Temperature sensor, fuel
Connentions 5 and 6
Test temperature:

15°...30°C, kohms	: 1.2...4.0
50°...70°C, kohms	: 0.3...1.2
Connections 5 and ground, Mohms min.	: 1.0
Connections 6 and ground Mohms min.	: 1.0

Solenoid valve, start of injection
Connections 1 and 2
Test temperature :

15°...30°C, ohms	: 14.3...17.3
50°...70°C, ohms	: 15.5...21.0
Starting stop mV	: 4120...4650
Shutoff stop mV	: 650...850

L3

Setting values of injection pump
Check values in brackets

Supply pump pressure:
Speed 1/min : 1500
Checkbk. volt.
mV : 2820
Setting value, bar : 7.3...8.1

Timing device travel:
Speed 1/min : 1500
Checkbk. volt
mV : 2820
Setting value, mm : 8.5...8.7

Full-load delivery :
1st temperature-conditioning
revolution 1/min : 1500
Checkbk. volt
mV : 2820
Fuel delivery cm^3/
> 1000s : 45.1...45.5
Dispersion cm^3/ : 2.0
> 1000s :

Test specifications of injection pump
Check values in brackets

Supply pump pressure variations:

1st speed 1/min : 2400
Checkbk. volt
mV : 2520
Supply pump
pressure > bar : 8.8...9.8
> bar :

2st speed 1/min : 350
Checkbk. volt
mV : 3470
Supply pump
pressure > bar : 5.3...6.5
> bar :

Timing device variations:

1st speed 1/min : 350
Checkbk. volt. mV : 3470
Timing device
travel mm : 5.0...6.4
> mm : (4.4...7.0)

2nd speed 1/min : 1500
Checkbk. volt. mV : 2820
Timing device
travel mm :
> mm : (7.8...9.4)

3rd speed 1/min : 1500
Checkbk. volt. mV : 2820
Timing device
travel mm : 0.0...0.4
> mm :
Solenoid valve
Start of
injection, volts : 12

4.th speed 1/min : 2300
Checkbk. volt. mV : 2820
Timing device
travel mm : 9.5...10.1
> mm : (9.3...10.3)
5.th speed 1/min : 150
Checkbk. volt. mV : 3470
Timing device
travel mm : 2.7...5.1
> mm : (1.9...5.9)

Overflow at overflow valve:

Speed 1/min : 2400
Checkbk. volt. mV : 2820
Overflow : 69...180
> cm^3/10s :

L4

Fuel delivery variations:

1. Speed	1/min	: 2400
Checkbk. volt	mV	: 2820
Fuel delivery	cm³/	: 45.4...48.0
>	1000s	: (44.2...49.2)
Dispersion	cm³/	: 2.5
>	1000s.	:
2. Speed	1/min	: 1500
Checkbk. volt	mV	: 2820
Fuel delivery	cm³/	:
>	1000s	: (44.0...46.0)
Dispersion	cm³/	:
>	1000s	: (3.0)
3. Speed	1/min	: 1000
Checkbk. volt	mV	: 2910
Fuel delivery	cm³/	: 46.6...48.6
>	1000s	: (45.6...49.6)
Dispersion	cm³/	: 2.0
>	1000s	: (3.0)
4. Speed	1/min	: 1000
Checkbk. volt	mV	: 2170
Fuel delivery	cm³/	: 14.4...15.8
>	1000s	: (13.8...16.4)
Dispersion	cm³/	: 2.0
>	1000s	:
5. Speed	1/min	: 5000
Checkbk. volt	mV	: 2820
Fuel delivery	cm³/	: 30.5...33.1
>	1000s	: (29.8...33.8)
Dispersion	cm³/	: 2.0
>	1000s	:

Idle delivery:

Speed	1/min	: 350
Checkbk. volt	mV	: 2430
Fuel delivery	cm³/	: 8.8...11.4
>	1000s	: (7.6...12.6)
Solenoid valve Start of injection, volts		: 12
Dispersion	cm³/	: 2.0
>	1000s	: (3.0)

Starting fuel delivery:

Speed	1/min	: 100
Checkbk. volt	mV	: 3470
Fuel delivery	cm³/	:
>	1000s	: 33.0
Solenoid valve Start of injection, volts		: 12

Stop test:

Speed	1/min	: 500
Checkbk. volt	mV	: 2820
ELAB	volts	: 0
Fuel delivery	cm³/	:
max.	1000s	: 3.0

Shutoff solenoid:

Cut-in voltage min.>	volts	: 10.0
Rated voltage,	volts	: 12.0

Dimensions for mounting and setting:

Description		
K	mm	:
KF	mm	:
SVS max.	mm	:
FH	mm	:
Prestroke..	mm	: 0,28...0,32
		: (0,26...0,34)

L5

BOSCH INJECTION PUMP TEST SPECIFICATIONS

Obsereve notes in remark colum

Test sheet : VW
Date of manufacture :
Edition : 09.08.1996
Replaces :
Test oil : ISO 4113

Injection pump : VE4/11E2075R712

Type No. : 0 460 414 990
Customer Ident.No. :

Customer-specific details
Customer : VW

Engine : 1.9 TDI

Output kW :
Speed 1/min :

TEST BENCH PREREQUISITES

Inlet pressure, bar : 0.30...0.40

Calibrating nozzle-holder assembly > : 1 688 901 114

Opening pressure > bar : 207...210

Test pressure line : 1 680 750 085

Outer diameter : 6.00
x wall thickness > : 2.20
x length > mm : 350

Overflow valve : 2 467 413 018

Test line : 0 986 612 444
(fuel-delivery actuator) :(

Test line : 1 687 011 208
(solenoid valve start of injection) : (Test cable set)

TEST PRECONDITIONS

Test oil return temp. > °C with thermometer : 55

Test oil supply temperature > °C : 42...47

Hold-up revolutions >1/min : 1200
Feedback voltage mV : 2500

ELECTRICAL TEST

Actuator
Connections 5 and 6
Test temperature:
15°...30°C, ohms : 0.4...1.0
50°...70°C, ohms : 0.45...1.1

Connections 5 and. ground, Mohms min. : 1.0
Connections 6 and ground, Mohms min. : 1.0
Connections 3 and 5 Mohms min. : 1.0
Connections 6 and 7 Mohms min. : 1.0

High-pressure compressor sensor
Sensor coils
Connections 1 and 2
Ohms : 4.9...6.5
Connections 2 and 3
Ohms : 4.9...6.5
Connections 1 and 3
Ohms : 9.8...13.0

Connections 1 and. ground, Mohms min. : 1.0
Connections 2 and ground, Mohms min. : 1.0
Connections 3 and ground, Mohms min. : 1.0

Temperature sensor, fuel
Connentions 4 and 7
Test temperature:
15°...30°C, kohms : 1.2...4.0
50°...70°C, kohms : 0.3...1.2

Connections 4 and ground, Mohms min. : 1.0
Connections 7 and ground Mohms min. : 1.0

Solenoid valve, start of injection
Connections 1 and 2
Test temperature :
15°...30°C, ohms : 14.3...17.3
50°...70°C, ohms : 15.5...21.0

Starting stop mV : 4120...4650

Shutoff stop mV : 650...850

L6

L6

Setting values of injection pump
Check values in brackets

Supply pump pressure:
Speed 1/min : 750
Checkbk. volt.
mV : 2340
Setting value, bar : 8.4...8.6

Timing device travel:
Speed 1/min : 750
Checkbk. volt
mV : 2340
Setting value, mm : 11.9...12.7

Full-load delivery :
1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt
mV : 2500
Output
temperature °C : 61
Speed 1/min : 750
Checkbk. volt
mV : 2340
Measuring
temperature °C : 57
Fuel delivery cm³/
> 1000s : 38.3...38.7
Dispersion cm³/ : 2.5
> 1000s :

Test specifications of injection pump
Check values in brackets

Supply pump pressure variations:

1st speed 1/min : 2000
Checkbk. volt
mV : 3790
Supply pump
pressure > bar : 10.4...11.0
> bar :

2st speed 1/min : 300
Checkbk. volt
mV : 2450
Supply pump
pressure > bar : 5.6...7.2
> bar :

Timing device variations:

1st speed 1/min : 400
Checkbk. volt. mV : 2450
Timing device
travel mm : 9.8...11.2
> mm : (8.0...14.0)

2nd speed 1/min : 2000
Checkbk. volt. mV : 3790
Timing device
travel mm : 11.8...12.8
> mm : (11.5...13.1)

3rd speed 1/min : 1300
Checkbk. volt. mV : 1400
Timing device
travel mm : max. 0.3
> mm : (max. 1.0)
Solenoid valve
Start of
injection, volts : 12

4.th speed 1/min : 750
Checkbk. volt. mV : 2340
Timing device
travel mm :
> mm : (11.5...13.1)

Overflow at overflow valve:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt. mV : 2500
Output
temperature °C : 51
Speed 1/min : 2000
Checkbk. volt. mV : 3790
Measuring
temperature °C : 53
Overflow : 133...188
> cm³/10s :

L7

Fuel delivery variations:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt mV : 2500
Output
temperature °C : 51
Speed 1/min : 2000
Checkbk. volt mV : 3790
Meßtemperatur °C : 53
Fuel delivery cm³/ : 60.3...62.7
> 1000s : (59.7...63.3)
Dispersion cm³/ : 3.0
> 1000s. : (3.0)

2nd temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 750
Checkbk. volt mV : 2340
Measuring
temperature °C : 57
Fuel delivery cm³/ :
> 1000s : (37.0...40.0)
Dispersion cm³/ :
> 1000s : (3.0)

3rd temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 1000
Checkbk. volt mV : 3070
Measuring
temperature °C : 57
Fuel delivery cm³/ : 55.8...58.2
> 1000s : (55.2...58.8)
Dispersion cm³/ :
> 1000s :

4th temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 500
Checkbk. volt mV : 2450
Measuring
temperature °C : 57
Fuel delivery cm³/ : 47.2...49.8
> 1000s : (46.5...50.5)
Dispersion cm³/ : 3.0
> 1000s : (3.0)

Idle delivery:
1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 400
Checkbk. volt mV : 1760
Meßtemperatur °C : 57
Fuel delivery cm³/ : 14.5...18.5
> 1000s : (13.5...19.5)
Solenoid valve
Start of
injection, volts : 12
Dispersion cm³/ : 3.0
> 1000s : (4.0)

Starting fuel delivery:
1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 65
Speed 1/min : 100
Checkbk. volt mV : 2450
Measuring
temperature °C : 61
Fuel delivery cm³/ : 48.0...60.0
> 1000s : (44.0...64.0)
Solenoid valve
Start of
injection, volts : 12

Stop test:
Speed 1/min : 1200
Checkbk. volt mV : 2340
ELAB volts : 0
Fuel delivery cm³/ :
max. 1000s : 3.0
Start of

Shutoff solenoid:
Cut-in voltage
min.> volts : 10.0
Rated voltage,
volts : 12.0

Notes:
High-pressure compressor sensor
Testing only possible with ballast
EPS 910

Take note of test instructions
"Distributor pump for direct
injectors"!

Dimensions for mounting and setting:

Description		
K	mm	:
KF	mm	:
SVS max.	mm	:
FH	mm	:
TS		: 2 467 010 004

L8

L8

BOSCH INJECTION PUMP TEST SPECIFICATIONS

Obsereve notes in remark colum

Test sheet : ROW
Date of manufacture :
Edition : 15.11.1996
Replaces :
Test oil : ISO 4113

Injection pump : VE4/11E2000R500-1

Type No. : 0 460 414 991
Customer Ident.No. :

Customer-specific details
Customer : ROW

Engine : Gemini 3

Output kW :
Speed 1/min :

TEST BENCH PREREQUISITES

Inlet pressure, bar : 0.30...0.40

Calibrating nozzle-holder assembly > : 1 688 901 116

Opening pressure > bar : 207...210

Test pressure line : 1 680 750 085

Outer diameter : 6.00
x wall thickness > : 2.20
x length > mm : 350

Overflow valve :

Test line : 0 986 612 437
(fuel-delivery actuator)

Test line : 0 986 612 438
(solenoid valve start of injection)

TEST PRECONDITIONS

Test oil return temp. > °C with thermometer : 55

Test oil supply temperature > °C : 42...47

Hold-up revolutions >1/min : 1200
Feedback voltage mV : 2500

ELECTRICAL TEST

Actuator
Connections 5 and 6
Test temperature:
15°...30°C, ohms : 0.4...1.0
50°...70°C, ohms : 0.45...1.1

Connections 5 and. ground, Mohms min. : 1.0
Connections 6 and ground, Mohms min. : 1.0
Connections 3 and 5 Mohms min. : 1.0
Connections 6 and 7 Mohms min. : 1.0

High-pressure compressor sensor
Sensor coils
Connections 1 and 2
Ohm : 4.9...6.5
Connections 2 and 3
Ohm : 4.9...6.5
Connections 1 and 3
Ohm : 9.8...13.0

Connections 1 and. ground, Mohms min. : 1.0
Connections 2 and ground, Mohms min. : 1.0
Connections 3 and ground, Mohms min. : 1.0

Temperature sensor, fuel
Connentions 4 and 7
Test temperature:
15°...30°C, kohms : 1.2...4.0
50°...70°C, kohms : 0.3...1.2

Connections 4 and ground, Mohms min. : 1.0
Connections 7 and ground Mohms min. : 1.0

Solenoid valve, start of injection
Connections 1 and 2
Test temperature :
15°...30°C, ohms : 14.3...17.3
50°...70°C, ohms : 15.5...21.0

Starting stop mV : 4120...4650

Shutoff stop mV : 650...850

L9

(3

Setting values of injection pump
Check values in brackets

Supply pump pressure:
Speed 1/min : 1000
Checkbk. volt.
mV : 3500
Setting value, bar : 5.8...7.2

Timing device travel:
Speed 1/min : 1000
Checkbk. volt
mV : 3500
Setting value, mm : 8.9...9.1

Full-load delivery :
1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt
mV : 2500
Output
temperature °C : 61
Speed 1/min : 750
Checkbk. volt
mV : 2430
Measuring
temperature °C : 57
Fuel delivery cm³/
> 1000s : 53.9...54.3
Dispersion cm³/ : 2.5
> 1000s :

Test specifications of injection pump
Check values in brackets

Supply pump pressure variations:

1st speed 1/min : 2000
Checkbk. volt
mV : 3500
Supply pump
pressure > bar : 7.5...8.9
> bar :

2st speed 1/min : 150
Checkbk. volt
mV : 2870
Supply pump
pressure > bar : 3.5...6.5
> bar :

Timing device variations:

1st speed 1/min : 1000
Checkbk. volt. mV : 3500
Timing device
travel mm :
> mm : (8.0...10.0)

2nd speed 1/min : 2000
Checkbk. volt. mV : 3500
Timing device
travel mm : 11.8...12.8
> mm : (11.6...13.0)

3rd speed 1/min : 1000
Checkbk. volt. mV : 1560
Timing device
travel mm : max. 3.0
> mm : (max. 3.0)
Solenoid valve
Start of
injection, volts : 12

4.th speed 1/min : 500
Checkbk. volt. mV : 2870
Timing device
travel mm : 6.1...8.5
> mm : (5.8...8.8)

Overflow at overflow valve:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt. mV : 2500
Output
temperature °C : 51
Speed 1/min : 2000
Checkbk. volt. mV : 3500
Measuring
temperature °C : 53
Overflow : 97...153
> cm³/10s:

L10

L10

Fuel delivery variations:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt mV : 2500
Output
temperature °C : 51
Speed 1/min : 2000
Checkbk. volt mV : 3500
Meßtemperatur °C : 53
Fuel delivery cm³/ : 67.5...70.5
> 1000s :
Dispersion cm³/ : 2.5
> 1000s. :

2nd temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 60
Speed 1/min : 1000
Checkbk. volt mV : 3200
Measuring
temperature °C : 56
Fuel delivery cm³/ : 77.9...80.9
> 1000s : (77.4...81.4)
Dispersion cm³/ : 2.5
> 1000s :

3rd temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 750
Checkbk. volt mV : 2430
Measuring
temperature °C : 57
Fuel delivery cm³/ :
> 1000s : (52.4...55.8)
Dispersion cm³/ :
> 1000s : (3.0)

4th temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 500
Checkbk. volt mV : 2870
Measuring
temperature °C : 57
Fuel delivery cm³/ : 85.4...89.0
> 1000s : (84.9...89.5)
Dispersion cm³/ : 2.5
> 1000s :

Idle delivery:
1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 500
Checkbk. volt mV : 1750
Meßtemperatur °C : 57
Fuel delivery cm³/ : 19.9...24.9
> 1000s : (19.4...25.4)
Solenoid valve
Start of
injection, volts : 12
Dispersion cm³/ : 3.0
> 1000s : (4.0)

Starting fuel delivery:
1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 65
Speed 1/min : 100
Checkbk. volt mV : 3130
Measuring
temperature °C : 61
Fuel delivery cm³/ : 83.0...99.0
> 1000s : (80.0...102.0)
Solenoid valve
Start of
injection, volts : 12

Stop test:
Speed 1/min : 1200
Checkbk. volt mV : 3000
ELAB volts : 0
Fuel delivery cm³/ :
max. 1000s : 3.0

Shutoff solenoid:
Cut-in voltage
min.> volts : 10.0
Rated voltage,
volts : 12.0

Notes:
High-pressure compressor sensor
Testing only possible with ballast
EPS 910

Take note of test instructions
"Distributor pump for direct
injectors"!

Dimensions for mounting and setting:

Description
K mm :
KF mm : 6.5...6.9
SVS max. mm :
FH mm :
TS : 1 467 010 494

L11

L11

BOSCH INJECTION PUMP TEST SPECIFICATIONS

Obsereve notes in remark colum

Test sheet : ROW
Date of manufacture :
Edition : 30.10.1995
Replaces :
Test oil : ISO 4113

Injection pump : VE4/11E2250L580-1

Type No. : 0 460 414 992
Customer Ident.No. :

Customer-specific details
Customer : ROVER

Engine : TCIE

Output kW :
Speed 1/min :

TEST BENCH PREREQUISITES

Inlet pressure, bar : 0.30...0.40

Calibrating nozzle-holder assembly > : 1 688 901 114

Opening pressure > bar : 207...210

Test pressure line : 1 680 750 085

Outer diameter : 6.00
x wall thickness > : 2.20
x length > mm : 350

Overflow valve :

Test line : 0 986 612 437
(fuel-delivery actuator)

Test line : 0 986 612 438
(solenoid valve
start of injection)

TEST PRECONDITIONS

Test oil
return temp. > °C
with thermometer : 55

Test oil supply
temperature > °C : 42...47

Hold-up
revolutions >1/min : 1200
Feedback
voltage mV : 2500

ELECTRICAL TEST

Actuator
Connections 5 and 6
Test temperature:
15°...30°C, ohms : 0.4...1.0
50°...70°C, ohms : 0.45...1.1

Connections 5 and.
ground, Mohms min. : 1.0
Connections 6 and
ground, Mohms min. : 1.0
Connections 3 and 5
Mohms min. : 1.0
Connections 6 and 7
Mohms min. : 1.0

High-pressure compressor sensor
Sensor coils
Connections 1 and 2
Ohm : 4.9...6.5
Connections 2 and 3
Ohm : 4.9...6.5
Connections 1 and 3
Ohm : 9.8...13.0

Connections 1 and.
ground, Mohms min. : 1.0
Connections 2 and
ground, Mohms min. : 1.0
Connections 3 and
ground, Mohms min. : 1.0

Temperature sensor, fuel
Connentions 4 and 7
Test temperature:
15°...30°C, kohms : 1.2...4.0
50°...70°C, kohms : 0.3...1.2

Connections 4 and
ground, Mohms min. : 1.0
Connections 7 and
ground Mohms min. : 1.0

Solenoid valve, start of injection
Connections 1 and 2
Test temperature :
15°...30°C, ohms : 14.3...17.3
50°...70°C, ohms : 15.5...21.0

Starting stop mV : 4120...4650

Shutoff stop mV : 650...850

L12

Setting values of injection pump
Check values in brackets

Supply pump pressure:
Speed 1/min : 1000
Checkbk. volt.
mV : 3400
Setting value, bar : 6.6...7.9

Timing device travel:
Speed 1/min : 1000
Checkbk. volt
mV : 3400
Setting value, mm : 7.8...8.0

Full-load delivery :
1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt
mV : 2500
Output
temperature °C : 61
Speed 1/min : 750
Checkbk. volt
mV : 2450
Measuring
temperature °C : 57
Fuel delivery cm³/
> 1000s : 38.4...38.8
Dispersion cm³/ : 2.5
> 1000s :

Test specifications of injection pump
Check values in brackets

Supply pump pressure variations:

1st speed 1/min : 2250
Checkbk. volt
mV : 3400
Supply pump
pressure > bar : 8.4...9.8
> bar :

2st speed 1/min : 500
Checkbk. volt
mV : 3400
Supply pump
pressure > bar : 6.0...7.2
> bar :

3st speed 1/min : 150
Checkbk. volt
mV : 2560
Supply pump
pressure > bar : 3.5...10.5
> bar :

Timing device variations:

1st speed 1/min : 500
Checkbk. volt. mV : 3400
Timing device
travel mm : 4.5...7.3
> mm : (3.9...7.9)

2nd speed 1/min : 2250
Checkbk. volt. mV : 3400
Timing device
travel mm : 9.4...10.2
> mm : (9.2...10.4)

3rd speed 1/min : 1500
Checkbk. volt. mV : 1650
Timing device
travel mm : max. 0.5
> mm : (max. 3.5)
Solenoid valve
Start of
injection, volts : 12

4.th speed 1/min : 1000
Checkbk. volt. mV : 3400
Timing device
travel mm :
> mm : (6.9...8.9)

Overflow at overflow valve:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt. mV : 2500
Output
temperature °C : 51
Speed 1/min : 2250
Checkbk. volt. mV : 3400
Measuring
temperature °C : 53
Overflow : 108...191
> cm³/10 :

Fuel delivery variations:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt mV : 2500
Output
temperature °C : 51
Speed 1/min : 2250
Checkbk. volt mV : 3400
Meßtemperatur °C : 53
Fuel delivery cm³/ : 41.7...44.3
> 1000s : (41.0...45.0)
Dispersion cm³/ : 3.0
> 1000s. :

2nd temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 60
Speed 1/min : 1250
Checkbk. volt mV : 3200
Measuring
temperature °C : 56
Fuel delivery cm³/ : 48.9...51.9
> 1000s : (48.1...52.7)
Dispersion cm³/ : 3.0
> 1000s :

3rd temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 750
Checkbk. volt mV : 2450
Measuring
temperature °C : 57
Fuel delivery cm³/ :
> 1000s : (37.1...40.1)
Dispersion cm³/ :
> 1000s : (3.0)

4th temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 500
Checkbk. volt mV : 2450
Measuring
temperature °C : 57
Fuel delivery cm³/ : 44.6...47.2
> 1000s : (43.9...47.9)
Dispersion cm³/ : 3.0
> 1000s :

Idle delivery:
1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 500
Checkbk. volt mV : 1600
Meßtemperatur °C : 57
Fuel delivery cm³/ : 9.9...10.9
> 1000s : (7.4...13.4)
Solenoid valve
Start of
injection, volts : 12
Dispersion cm³/ : 3.0
> 1000s : (4.0)

Starting fuel delivery:
1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 65
Speed 1/min : 100
Checkbk. volt mV : 2560
Measuring
temperature °C : 61
Fuel delivery cm³/ : 43.5...57.5
> 1000s : (39.5...61.5)
Solenoid valve
Start of
injection, volts : 12

Stop test:
Speed 1/min : 1000
Checkbk. volt mV : 3400
ELAB volts : 0
Fuel delivery cm³/ :
max. 1000s : 3.0

Shutoff solenoid:
Cut-in voltage
min.> volts : 10.0
Rated voltage,
volts : 12.0

Notes:
High-pressure compressor sensor
Testing only possible with ballast
EPS 910

Take note of test instructions
"Distributor pump for direct
injectors"!

Dimensions for mounting and setting:

Description
K mm :
KF mm :6.5...6.9
SVS max. mm :
FH mm :
TS : 1 467 010 494

L14

BOSCH INJECTION PUMP TEST SPECIFICATIONS

Obsereve notes in remark colum

Test sheet	: Renault
Date of manufacture	:
Edition	: 22.05.1996
Replaces	:
Test oil	: ISO 4113
Injection pump	: VE4/11E2000R672
Type No.	: 0 460 414 993
Customer Ident.No.	:

Customer-specific details

Customer	: Renault
Engine	: F 9 Q 730
Output kW	:
Speed 1/min	:

TEST BENCH PREREQUISITES

Inlet pressure, bar	: 0.30...0.40
Calibrating nozzle-holder assembly >	: 1 688 901 114
Opening pressure > bar	: 207...210
Test pressure line	: 1 680 750 085
Outer diameter	: 6.00
x wall thickness >	: 2.20
x length > mm	: 350
Overflow valve	: 2 467 413 018
Test line	: 0 986 612 434
(fuel-delivery actuator)	: (KDEP 1865/5)
Test line	: 0 986 612 435
(solenoid valve start of injection)	: (KDEP 1865/6)

TEST PRECONDITIONS

Test oil return temp. > °C with thermometer	: 55
Test oil supply temperature > °C	: 42...47
Hold-up revolutions >1/min	: 1200
Feedback voltage mV	: 2500

ELECTRICAL TEST

Actuator
Connections 4 and 7
Test temperature:

15°...30°C, ohms	: 0.4...1.0
50°...70°C, ohms	: 0.45...1.1
Connections 4 and. ground, Mohms min.	: 1.0
Connections 7 and ground, Mohms min.	: 1.0
Connections 2 and 7 Mohms min.	: 1.0
Connections 4 and 6 Mohms min.	: 1.0

High-pressure compressor sensor
Sensor coils

Connections 1 and 3 Ohm	: 4.9...6.5
Connections 2 and 3 Ohm	: 4.9...6.5
Connections 1 and 2 Ohm	: 9.8...13.0
Connections 1 and. ground, Mohms min.	: 1.0
Connections 2 and ground, Mohms min.	: 1.0
Connections 3 and ground, Mohms min.	: 1.0

Temperature sensor, fuel
Connentions 5 and 6
Test temperature:

15°...30°C, kohms	: 1.2...4.0
50°...70°C, kohms	: 0.3...1.2
Connections 4 and ground, Mohms min.	: 1.0
Connections 7 and ground Mohms min.	: 1.0

Solenoid valve, start of injection
Connections 1 and 2
Test temperature :

15°...30°C, ohms	: 14.3...17.3
50°...70°C, ohms	: 15.5...21.0
Starting stop mV	: 4120...4650
Shutoff stop mV	: 650...850

L15

Setting values of injection pump
Check values in brackets

Supply pump pressure:
Speed 1/min : 500
Checkbk. volt.
mV : 2100
Setting value, bar : 6.9...8.1

Timing device travel:
Speed 1/min : 500
Checkbk. volt
mV : 2100
Setting value, mm : 10.9...11.1

Full-load delivery :
1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt
mV : 2500
Output
temperature °C : 61
Speed 1/min : 750
Checkbk. volt
mV : 2480
Measuring
temperature °C : 57
Fuel delivery cm³/
> 1000s : 35.8...36.2
Dispersion cm³/ : 2.5
> 1000s :

Test specifications of injection pump
Check values in brackets

Supply pump pressure variations:

1st speed 1/min : 2000
Checkbk. volt
mV : 3670
Supply pump
pressure > bar : 9.4...10.6
> bar :

2st speed 1/min : 200
Checkbk. volt
mV : 2100
Supply pump
pressure > bar : 5.0...7.0
> bar :

Timing device variations:

1st speed 1/min : 200
Checkbk. volt. mV : 2100
Timing device
travel mm : 4.9...8.9
> mm : (3.9...9.9)

2nd speed 1/min : 2000
Checkbk. volt. mV : 3670
Timing device
travel mm : 11.8...12.8
> mm : (11.5...13.1)

3rd speed 1/min : 1500
Checkbk. volt. mV : 1500
Timing device
travel mm : max. 1.0
> mm : (max. 1.2)
Solenoid valve
Start of
injection, volts : 12

Overflow at overflow valve:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt. mV : 2500
Output
temperature °C : 51
Speed 1/min : 2000
Checkbk. volt. mV : 3670
Measuring
temperature °C : 53
Overflow : 118...202
> cm³/10 :

Fuel delivery variations:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt mV : 2500
Output
temperature °C : 51
Speed 1/min : 2000
Checkbk. volt mV : 3670
Meßtemperatur °C : 53
Fuel delivery cm³/ : 44.7...47.3
> 1000s : (44.0...48.0)
Dispersion cm³/ : 3.0
> 1000s. :

2nd temperature-conditioning
revolution 1/min : 100
Checkbk. volt mV : 2500
Output
temperature °C : 51
Speed 1/min : 1500
Checkbk. volt mV : 3490
Measuring
temperature °C : 53
Fuel delivery cm³/ : 46.8...19.8
> 1000s : (46.0...50.6)
Dispersion cm³/ : 3.0
> 1000s :

3rd temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 750
Checkbk. volt mV : 2480
Measuring
temperature °C : 57
Fuel delivery cm³/ :
> 1000s : (34.5...37.5)
Dispersion cm³/ :
> 1000s : (3.0)

4th temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 500
Checkbk. volt mV : 2100
Measuring
temperature °C : 57
Fuel delivery cm³/ : 26.9...30.9
> 1000s : (25.9...31.9)
Dispersion cm³/ : 3.0
> 1000s :

Idle delivery:
1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 550
Checkbk. volt mV : 1800
Meßtemperatur °C : 57
Fuel delivery cm³/ : 15.0...16.0
> 1000s : (12.5...18.5)
Solenoid valve
Start of
injection, volts : 12
Dispersion cm³/ : 3.0
> 1000s : (4.0)

Starting fuel delivery:
1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 65
Speed 1/min : 100
Checkbk. volt mV : 2640
Measuring
temperature °C : 61
Fuel delivery cm³/ : 42.0...58.0
> 1000s : (36.0...64.0)
Solenoid valve
Start of
injection, volts : 12

Stop test:
Speed 1/min : 900
Checkbk. volt mV : 3490
ELAB volts : 0
Fuel delivery cm³/ :
max. 1000s : 3.0

Shutoff solenoid:
Cut-in voltage
min.> volts : 10.0
Rated voltage,
volts : 12.0

Notes:
High-pressure compressor sensor
Testing only possible with ballast
EPS 910

Take note of test instructions
"Distributor pump for direct
injectors"!

Dimensions for mounting and setting:

Description
K mm :
KF mm :
SVS max. mm :
FH mm :

BOSCH INJECTION PUMP TEST SPECIFICATIONS

Obsereve notes in remark colum

Test sheet	: ROW
Date of manufacture	:
Edition	: 08.07.1994
Replaces	:
Test oil	: ISO 4113
Injection pump	: VE4/11E2250L580
Type No.	: 0 460 414 995
Customer Ident.No.	:

Customer-specific details

Customer	: ROVER
Engine	: TCIE
Output kW	:
Speed 1/min	:

TEST BENCH PREREQUISITES

Inlet pressure, bar	: 0.30...0.40
Calibrating nozzle-holder assembly >	: 1 688 901 114
Opening pressure > bar	: 207...210
Test pressure line	: 1 680 750 085
Outer diameter	: 6.00
x wall thickness >	: 2.20
x length > mm	: 350
Overflow valve	:
Test line (fuel-delivery actuator)	: 0 986 612 437
Test line (solenoid valve start of injection)	: 0 986 612 438

TEST PRECONDITIONS

Test oil return temp. > °C with thermometer	: 55
Test oil supply temperature > °C	: 42...47
Hold-up revolutions >1/min	: 1200
Feedback voltage mV	: 2500

ELECTRICAL TEST

Actuator
Connections 5 and 6
Test temperature:

15°...30°C, ohms	: 0.4...1.0
50°...70°C, ohms	: 0.45...1.1
Connections 5 and. ground, Mohms min.	: 1.0
Connections 6 and ground, Mohms min.	: 1.0
Connections 3 and 5 Mohms min.	: 1.0
Connections 6 and 7 Mohms min.	: 1.0

High-pressure compressor sensor
Sensor coils
Connections 1 and 2

Ohm	: 4.9...6.5
Connections 2 and 3 Ohm	: 4.9...6.5
Connections 1 and 3 Ohm	: 9.8...13.0
Connections 1 and. ground, Mohms min.	: 1.0
Connections 2 and ground, Mohms min.	: 1.0
Connections 3 and ground, Mohms min.	: 1.0

Temperature sensor, fuel
Connentions 4 and 7
Test temperature:

15°...30°C, kohms	: 1.2...4.0
50°...70°C, kohms	: 0.3...1.2
Connections 4 and ground, Mohms min.	: 1.0
Connections 7 and ground Mohms min.	: 1.0

Solenoid valve, start of injection
Connections 1 and 2

Test temperature	:
15°...30°C, ohms	: 14.3...17.3
50°...70°C, ohms	: 15.5...21.0
Starting stop mV	: 4120...4650
Shutoff stop mV	: 650...850

L18

Setting values of injection pump
Check values in brackets

Supply pump pressure:
Speed 1/min : 1000
Checkbk. volt.
mV : 3400
Setting value, bar : 6.9...7.7

Timing device travel:
Speed 1/min : 1000
Checkbk. volt
mV : 3400
Setting value, mm : 7.8...8.0

Full-load delivery :
1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt
mV : 2500
Output
temperature °C : 61
Speed 1/min : 750
Checkbk. volt
mV : 2450
Measuring
temperature °C : 57
Fuel delivery cm^3/
> 1000s : 38.5...38.7
Dispersion cm^3/ : 2.5
> 1000s :

Test specifications of injection pump
Check values in brackets

Supply pump pressure variations:

1st speed 1/min : 2250
Checkbk. volt
mV : 3400
Supply pump
pressure > bar : 8.8...9.6
> bar :

2st speed 1/min : 500
Checkbk. volt
mV : 3400
Supply pump
pressure > bar : 6.2...7.0
> bar :

3st speed 1/min : 150
Checkbk. volt
mV : 2560
Supply pump
pressure > bar : 3.5...10.5
> bar :

Timing device variations:

1st speed 1/min : 500
Checkbk. volt. mV : 3400
Timing device
travel mm : 5.2...7.6
> mm : (4.4...8.4)

2nd speed 1/min : 2250
Checkbk. volt. mV : 3400
Timing device
travel mm : 9.4...10.2
> mm : (9.2...10.4)

3rd speed 1/min : 1500
Checkbk. volt. mV : 1650
Timing device
travel mm : max. 1.0
> mm : (max. 3.5)
Solenoid valve
Start of
injection, volts : 12

4.th speed 1/min : 1000
Checkbk. volt. mV : 3400
Timing device
travel mm :
> mm : (6.9...8.9)

Overflow at overflow valve:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt. mV : 2500
Output
temperature °C : 51
Speed 1/min : 2250
Checkbk. volt. mV : 3400
Measuring
temperature °C : 53
Overflow : 83...167
> cm^3/10 :

Fuel delivery variations:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt mV : 2500
Output
temperature °C : 51
Speed 1/min : 2250
Checkbk. volt mV : 3400
Meßtemperatur °C : 53
Fuel delivery cm³/ : 42.3...44.9
> 1000s : (41.6...45.6)
Dispersion cm³/ : 2.5
> 1000s. :

2nd temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 60
Speed 1/min : 1250
Checkbk. volt mV : 3200
Measuring
temperature °C : 56
Fuel delivery cm³/ : 49.2...52.2
> 1000s : (48.4...53.0)
Dispersion cm³/ : 3.0
> 1000s :

3rd temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 750
Checkbk. volt mV : 2450
Measuring
temperature °C : 57
Fuel delivery cm³/ :
> 1000s : (37.1...40.1)
Dispersion cm³/ :
> 1000s : (3.0)

4th temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 500
Checkbk. volt mV : 2450
Measuring
temperature °C : 57
Fuel delivery cm³/ : 44.4...47.0
> 1000s : (43.7...47.7)
Dispersion cm³/ : 3.0
> 1000s :

Idle delivery:
1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 500
Checkbk. volt mV : 1600
Meßtemperatur °C : 57
Fuel delivery cm³/ : 9.5...12.9
> 1000s : (8.2...14.2)
Solenoid valve
Start of
injection, volts : 12
Dispersion cm³/ : 3.0
> 1000s : (4.0)

Starting fuel delivery:
1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 65
Speed 1/min : 100
Checkbk. volt mV : 2560
Measuring
temperature °C : 61
Fuel delivery cm³/ : 43.5...57.5
> 1000s : (39.5...61.5)
Solenoid valve
Start of
injection, volts : 12

Stop test:
Speed 1/min : 1000
Checkbk. volt mV : 3400
ELAB volts : 0
Fuel delivery cm³/ :
max. 1000s : 3.0

Shutoff solenoid:
Cut-in voltage
min.> volts : 10.0
Rated voltage,
volts : 12.0

Notes:
High-pressure compressor sensor
Testing only possible with ballast
EPS 910

Take note of test instructions
"Distributor pump for direct
injectors"!

Dimensions for mounting and setting:

Description		
K	mm	:
KF	mm	: 6.5...6.9
SVS max.	mm	:
FH	mm	:
TS		: 1 467 010 494

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BOSCH INJECTION PUMP TEST SPECIFICATIONS

Obsereve notes in remark colum

Test sheet	: VW
Date of manufacture	:
Edition	: 12.06.1996
Replaces	:
Test oil	: ISO 4113
Injection pump	: VE5/11E1750L714
Type No.	: 0 460 415 986
Customer Ident.No.	:

Customer-specific details

Customer	: VW
Engine	: 2.5 TDI
Output kW	:
Speed 1/min	:

TEST BENCH PREREQUISITES

Inlet pressure, bar	: 0.30...0.40
Calibrating nozzle-holder assembly >	: 1 688 901 114
Opening pressure > bar	: 207...210
Test pressure line	: 1 680 750 085
Outer diameter	: 6.00
x wall thickness >	: 2.20
x length > mm	: 350
Overflow valve	: 2 467 413 018
Test line (fuel-delivery actuator)	: 0 986 612 444
Test line (solenoid valve start of injection)	: 1 687 011 208 (Test cable set)

TEST PRECONDITIONS

Test oil return temp. > °C with thermometer	: 55
Test oil supply temperature > °C	: 42...47
Hold-up revolutions >1/min	: 1200
Feedback voltage mV	: 2500

ELECTRICAL TEST

Actuator
Connections 5 and 6
Test temperature:

15°...30°C, ohms	: 0.4...1.0
50°...70°C, ohms	: 0.45...1.1
Connections 5 and. ground, Mohms min.	: 1.0
Connections 6 and ground, Mohms min.	: 1.0
Connections 3 and 5 Mohms min.	: 1.0
Connections 6 and 7 Mohms min.	: 1.0

High-pressure compressor sensor
Sensor coils

Connections 1 and 2 Ohms	: 4.9...6.5
Connections 2 and 3 Ohms	: 4.9...6.5
Connections 1 and 3 Ohms	: 9.8...13.0
Connections 1 and. ground, Mohms min.	: 1.0
Connections 2 and ground, Mohms min.	: 1.0
Connections 3 and ground, Mohms min.	: 1.0

Temperature sensor, fuel
Connentions 4 and 7
Test temperature:

15°...30°C, kohms	: 1.2...4.0
50°...70°C, kohms	: 0.3...1.2
Connections 4 and ground, Mohms min.	: 1.0
Connections 7 and ground Mohms min.	: 1.0

Solenoid valve, start of injection
Connections 1 and 2
Test temperature :

15°...30°C, ohms	: 14.3...17.3
50°...70°C, ohms	: 15.5...21.0
Starting stop mV	: 4120...4650
Shutoff stop mV	: 650...850

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Setting values of injection pump
Check values in brackets

Supply pump pressure:
Speed 1/min : 750
Checkbk. volt.
mV : 3900
Setting value, bar : 6.0...7.0

Timing device travel:
Speed 1/min : 750
Checkbk. volt
mV : 3900
Setting value, mm : 8.5...8.7

Full-load delivery :
1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt
mV : 2500
Output
temperature °C : 61
Speed 1/min : 750
Checkbk. volt
mV : 2400
Measuring
temperature °C : 57
Fuel delivery cm^3/
> 1000s : 36.4...36.8
Dispersion cm^3/ : 2.5
> 1000s :

Test specifications of injection pump
Check values in brackets

Supply pump pressure variations:

1st speed 1/min : 2000
Checkbk. volt
mV : 3790
Supply pump
pressure > bar : 7.4...8.4
> bar :

Timing device variations:

1st speed 1/min : 500
Checkbk. volt. mV : 3900
Timing device
travel mm : 6.6...9.0
> mm : (6.3...9.3)

2nd speed 1/min : 1750
Checkbk. volt. mV : 3670
Timing device
travel mm : 11.6...12.6
> mm : (11.5...12.7)

3rd speed 1/min : 1200
Checkbk. volt. mV : 1800
Timing device
travel mm : max. 0.3
> mm : (max. 2.5)
Solenoid valve
Start of
injection, volts : 12

4.th speed 1/min : 750
Checkbk. volt. mV : 3900
Timing device
travel mm :
> mm : (7.4...9.8)

Overflow at overflow valve:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt. mV : 2500
Output
temperature °C : 51
Speed 1/min : 1750
Checkbk. volt. mV : 3670
Measuring
temperature °C : 53
Overflow : 97...181
> cm^3/10s :

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Fuel delivery variations:

1st temperature-conditioning
revolution 1/min : 100
Checkbk. volt mV : 2500
Output
temperature °C : 51
Speed 1/min : 1750
Checkbk. volt mV : 3670
Meßtemperatur °C : 53
Fuel delivery cm³/ : 52.3...54.9
> 1000s : (51.6...55.6)
Dispersion cm³/ : 3.0
> 1000s. : (3.0)

2nd temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 750
Checkbk. volt mV : 2400
Measuring
temperature °C : 57
Fuel delivery cm³/ :
> 1000s : (35.3...37.9)
Dispersion cm³/ :
> 1000s : (2.5)

3rd temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 1000
Checkbk. volt mV : 3210
Measuring
temperature °C : 57
Fuel delivery cm³/ : 55.9...58.5
> 1000s : (55.2...59.2)
Dispersion cm³/ : 2.00
> 1000s : (2.5)

4th temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 500
Checkbk. volt mV : 2320
Measuring
temperature °C : 57
Fuel delivery cm³/ : 39.5...42.1
> 1000s : (38.8...42.8)
Dispersion cm³/ : 3.0
> 1000s : (3.0)

Idle delivery:
1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 61
Speed 1/min : 500
Checkbk. volt mV : 1520
Meßtemperatur °C : 57
Fuel delivery cm³/ : 6.9...10.9
> 1000s : (5.9...11.9)
Solenoid valve
Start of
injection, volts : 12
Dispersion cm³/ : 3.0
> 1000s : (4.0)

Starting fuel delivery:
1st temperature-conditioning
revolution 1/min : 2000
Checkbk. volt mV : 2500
Output
temperature °C : 65
Speed 1/min : 100
Checkbk. volt mV : 2960
Measuring
temperature °C : 61
Fuel delivery cm³/ : 72.0...86.0
> 1000s : (69.0...91.0)
Solenoid valve
Start of
injection, volts : 12

Stop test:
Speed 1/min : 1000
Checkbk. volt mV : 2460
ELAB volts : 0
Fuel delivery cm³/ :
max. 1000s : 5.0

Speed 1/min : 1500
Checkbk. volt mV : 4100
ELAB volts : 0
Fuel delivery cm³/ :
max. 1000s : 3.0
Solenoid valve
Start of
injection, volts : 12

Shutoff solenoid:
Cut-in voltage
min.> volts : 10.0
Rated voltage,
volts : 12.0

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Notes:
High-pressure compressor sensor
Testing only possible with ballast
EPS 910

Take note of test instructions
"Distributor pump for direct
injectors"!

Dimensions for mounting and setting:

Description		
K	mm	: 2.7...2.9
KF	mm	: 8.2...8.6
SVS max.	mm	:
FH	mm	:
TS		: 1 467 010 495

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